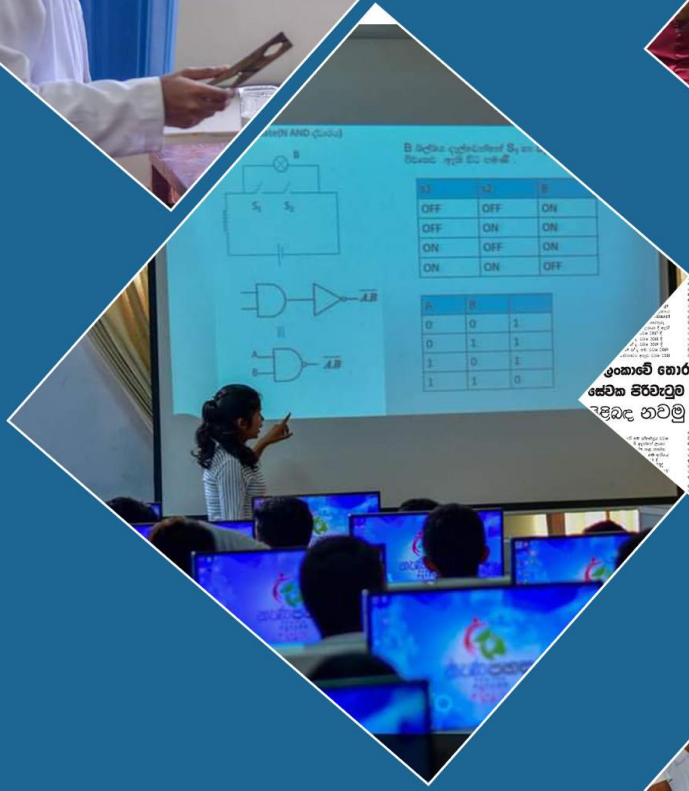
Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Physical Sciences and Technology



https://www.sab.ac.lk/app/physical-sciences-and-technologies

https://www.linkedin.com/company/faculty-of-applied-sciences-sabaragamuwa-university-of-sri-lanka/

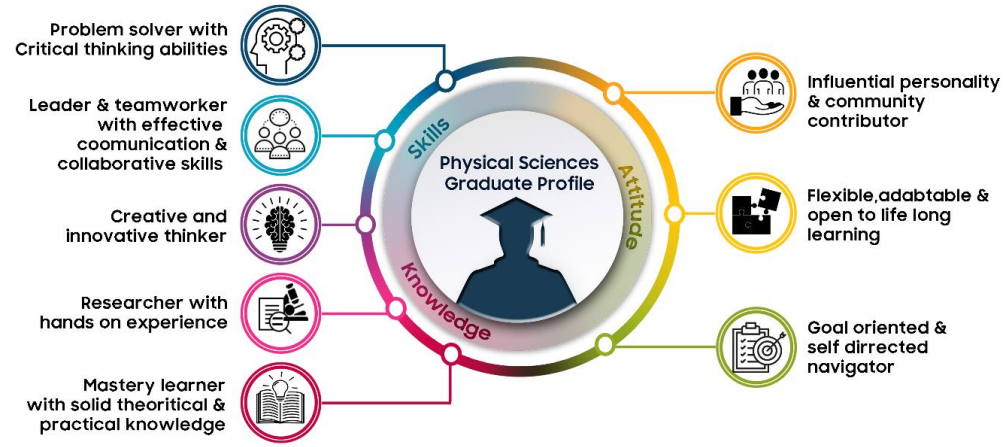
DEPARTMENT OF PHYSICAL SCIENCES & TECHNOLOGY

Degree Programs:

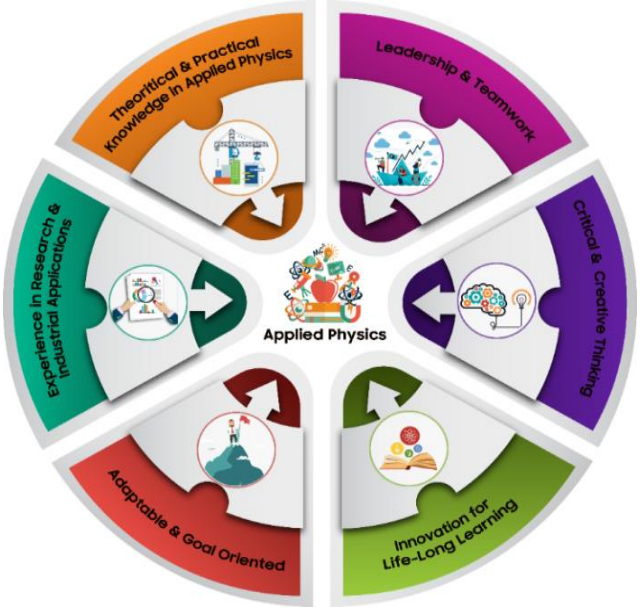
- Bachelor of Science in Physical Sciences
- Bachelor of Science Honours in Applied Physics
- Bachelor of Science Honours in Chemical Technology
- Bachelor of Science Honours in Computer Science and Technology

Anticipated Graduate Profile

Bachelor of Science in Physical Sciences

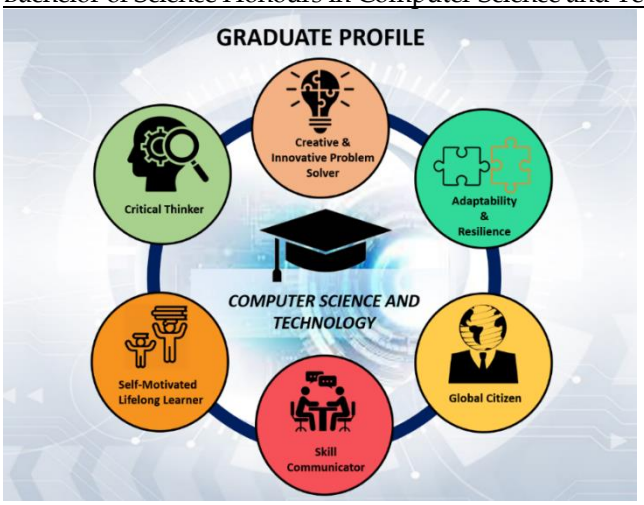


Bachelor of Science Honours in Applied Physics



Bachelor of Science Honours in Chemical Technology

Bachelor of Science Honours in Computer Science and Technology



Guideline for Course Codes and Credits

A course code contains, abbreviation to the name of degree program, year of study, semester of study, number of credits assigned for the subject and the subject code respectively.

Example: The course code of PST 12201 denotes the following.

Degree Program	Year	Semester	No. of Credits	Subject Code
Physical **S**ciences &**T**echnology	**1**	**2**	**2**	**01**

Summary of courses

Table 1: Courses offered in the Semester I of the First Year (*A student must earn a minimum of 16 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 11201	Mechanics and Properties of Matter	2	Compulsory	
PST 11202	Introduction to Electricity and Magnetism	2	Compulsory	
PST 11103	Physics Laboratory 1-I	1	Compulsory	
PST 11204	General Chemistry	2	Compulsory	
PST 11205	Fundamentals of Organic Chemistry	2	Compulsory	
PST 11106	Inorganic Chemistry Laboratory I	1	Compulsory	
PST 11107	Structured Programming	1	Compulsory	
PST 11208	Computer Hardware and Software	2	Compulsory	
PST 11109	Computer Laboratory 1-I	1	Compulsory	
PST 11210	Calculus and Differential Equations	2	Compulsory	
PST-EGP-1101	General English I	0	Compulsory	
	Total	**16**		
Table 2: Courses offered in the Semester II of the First Year (*A student must earn a minimum of 16 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 12201	Physics of Heat and Waves	2	Compulsory	
PST 12102	Semi-Conductor Physics	1	Compulsory	
PST 12103	AC Theory & Circuits	1	Compulsory	
PST 12104	Physics Laboratory 1-II	1	Compulsory	
PST 12205	Fundamentals of Physical Chemistry	2	Compulsory	
PST 12206	Fundamentals of Analytical Chemistry	2	Compulsory	PST11204
PST 12107	Organic Chemistry Laboratory I	1	Compulsory	PST11106
PST 12108	Object Oriented Programming	1	Compulsory	PST11107
PST 12209	Fundamentals of Statistics	2	Compulsory	
PST 12110	Computer Laboratory 1-II	1	Compulsory	PST11109
PST 12211	Database Management Systems	2	Compulsory	
PST-EGP-1201	General English II	0	Compulsory	
	Total	**16**		

Table 3: Courses offered in the Semester I of the Second Year (*A student must earn a minimum of 17 credits) Note: Those who are willing to do Chemical Technology must earn a minimum of 18 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 21201	Electronics	2	Compulsory	
PST 21202	Geometrical and Physical Optics	2	Compulsory	
PST 21103	Physics Laboratory 2-I	1	Compulsory	
PST 21204	Organic Chemistry	2	Compulsory	PST 11205
PST 21205	Industrial Chemistry and Technology I (Organic)	2	Compulsory	PST 11205
PST 21106	Organic Chemistry Laboratory II	1	Compulsory	PST 12107
PST 21207	Data Structures & Algorithms	2	Compulsory	PST 11107, PST 11109
PST 21208	Computer Architecture and Assembly Language	2	Compulsory	PST 11208
PST 21209	Statistics for Experimental Analysis	2	Compulsory	PST12209
PST 21110	Computer Laboratory 2-I	1	Compulsory	
PST 21111	Physical Chemistry Laboratory I	1	Elective (Compulsory for BSc Hons (Chem Tech))	PST 11106, PST 12205, PST 12206
PST-EAP-2101	Academic English I	0	Compulsory	
	Total	**18**		

Table 4: Courses offered in the Semester II of the Second Year (*A student must earn a minimum of 20 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 22201	Physics of Electromagnetic Radiation and Introduction to Laser	2	Compulsory	
PST 22202	Quantum Physics, Atomic & Nuclear Physics	2	Compulsory	
PST 22103	Physics Laboratory 2-II	1	Compulsory	
PST 22204	Chemistry of Elements	2	Compulsory	PST 11204
PST 22205	Physical Chemistry	2	Compulsory	PST 12205
PST 22106	Inorganic Chemistry Laboratory II	1	Compulsory	PST 11106
PST 22107	Analytical Chemistry Laboratory I	1	Elective (Compulsory for BSc Hons (Chem Tech))	PST 12206, PST 11106
PST 22208	Software Engineering	2	Compulsory	PST 21207
PST 22209	Statistical Methodology	2	Compulsory	PST12209 PST21209

PST 22110	Computer Laboratory 2-II	1	Compulsory	PST 11109
PST 22211	Operating Systems	2	Compulsory	PST 11211
PST 22112	Leadership and Communication	1	Elective	
PST 22213	Biology for Physical Sciences	2	Elective	
PST 22114	Soft Skill Development	1	Elective	
PST 22215	Mathematical Methods	2	Elective (Compulsory for BSc Hons (App Phy))	
PST 22116	Introduction to Astronomy	1	Elective (Compulsory for BSc Hons (App Phy))	
PST 22217	Industrial Metrology	2	Elective	
PST 22218	Management Information Systems	2	Elective (Compulsory for BSc Hons (Com Sc & Tech))	PST 12211
PST 22219	Molecular Spectroscopy	2	Elective (Compulsory for BSc Hons (Chem Tech))	PST11204, PST11205
PST-EAP-2201	Academic English II	0	Compulsory	
	Total	**31**		

GENERAL DEGREE COURSE B Sc DEGREE IN PHYSICAL SCIENCES

Table 5: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 16 credits)*

For BSc Degree in Physical Sciences (Majoring in Physics)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31201	Solid State Physics	2	Compulsory	PST 12102
PST 31202	Nuclear Physics & Applications	2	Compulsory	PST 22202
PST 31203	Quantum Mechanics	2	Compulsory	PST 22202
PST 31104	Material Physics	1	Compulsory	PST 12102
PST 31205	Special Relativity	2	Compulsory	PST 11201
PST 31206	Optical Fiber & Telecommunication	2	Compulsory	PST 21202
PST 31107	Introduction to Nanotechnology	1	Compulsory	
PST 31108	Physics Laboratory 3-I	1	Compulsory	PST 11103, PST 12103, PST 21103
PST 31209	The Origin and Evolution of the Universe	2	Elective	
PST 31210	Multimedia and Hypermedia	2	Elective	

	Systems Development			
PST 31211	Mathematical Programming	2	Compulsory	
PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	PST 11103 PST 12103, PST21103
PST-EBP-3101	Business English	0	Compulsory	
	Total	**23**		

Table 6: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 16 credits)*

For BSc Degree in Physical Sciences (Majoring Chemical Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31107	Introduction to Nanotechnology	1	Elective	PST 11204, PST 12205, PST 22205
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31216	Biochemistry – I	2	Compulsory	PST 11205
PST 31217	Electroanalytical Techniques	2	Compulsory	PST 11204, PST 12205
PST 31218	Industrial Chemistry and Technology - II (Inorganic)	2	Compulsory	PST 11204, PST 12206
PST 31219	Environmental Chemistry	2	Compulsory	PST 11204, PST 11205, PST 12206
PST 31220	Coordination Chemistry	1	Compulsory	PST 11204, PST 22204
PST 31121	Laboratory Quality Control and Assurance	1	Compulsory	PST 11106, PST 12206
PST 31122	Physical Chemistry Laboratory II	1	Compulsory	PST 11205, PST 21111
PST 31123	Analytical Chemistry Laboratory II	1	Compulsory	PST 12206, PST 22106, PST 22107
PST-EBP-3101	Business English	0	Compulsory	
	Total	**19**		

Table 7: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 16 credits)*

For BSc Degree in Physical Sciences (Majoring Computer Science and Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite

PST 31210	Multimedia and Hypermedia Systems Development	2	Compulsory	
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31215	Agile Software Development	2	Elective	PST 22208
PST 31224	Artificial Intelligence & Expert Systems	2	Compulsory	PST 21207
PST 31225	Software Project Management	2	Compulsory	PST 22208
PST 31226	Software Quality Assurances	2	Compulsory	PST 22208
PST 31227	Object Oriented Analysis and Design	2	Compulsory	PST 12108, PST 21207
PST 31128	Computer Laboratory 3-I	1	Compulsory	PST 11109
PST 31229	Advanced Database Management Systems	2	Compulsory	PST 22218
PST 31230	Social and Professional Issues in Computing	2	Elective	
PST-EBP-3101	Business English	0	Compulsory	
	Total	**21**		

Table 8: Courses offered in the Semester II of the Third Year (*A student must earn a minimum of 08 credits)*

For BSc Degree in Physical Sciences (Majoring in Physics)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32801	Project Work (Industrial Exposure): BSc Thesis in Physical Sciences (Major in Applied Physics)	8	Compulsory	
	Total	**8**		

Table 9: Courses offered in the Semester II of the Third Year (*A student must earn a minimum of 08 credits)*

For BSc Degree in Physical Sciences (Majoring Chemical Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32802	Project Work (Industrial Exposure): BSc Thesis in Physical Sciences (Major in Chemical Technology)	8	Compulsory	
	Total	**8**		

Table 10: Courses offered in the Semester II of the Third Year (*A student must earn a minimum of 08 credits)*

For BSc Degree in Physical Sciences (Majoring Computer Science and Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32803	Project Work (Industrial	8	Compulsory	

	Exposure): BSc Thesis in Physical Sciences (Major in Computer Science & Technology)			
	Total	**8**		

HONOURS DEGREE COURSE

BSC HONOURS DEGREE IN APPLIED PHYSICS/ CHEMICAL TECHNOLOGY/ COMPUTER SCIENCE & TECHNOLOGY

Table 11: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 17 credits)*

BSc Honours Degree in Applied Physics

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31201	Solid State Physics	2	Compulsory	PST 12102
PST 31202	Nuclear Physics & Applications	2	Compulsory	PST 22202
PST 31203	Quantum Mechanics	2	Compulsory	PST 22202
PST 31104	Material Physics	1	Compulsory	PST 12102
PST 31205	Special Relativity	2	Compulsory	PST 11201
PST 31206	Optical Fiber & Telecommunication	2	Compulsory	PST 21202
PST 31107	Introduction to Nanotechnology	1	Compulsory	
PST 31108	Physics Laboratory 3-I	1	Compulsory	PST 11103, PST 12103, PST 21103
PST 31209	The Origin and Evolution of the Universe	2	Compulsory	PST 22116
PST 31210	Multimedia and Hypermedia Systems Development	2	Elective	
PST 31211	Mathematical Programming	2	Compulsory	
PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	PST 11103, PST 12103, PST21103
PST-EBP-3101	Business English	0	Compulsory	
	Total	**23**		

Table 12: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 14 credits)*

BSc Honours Degree in Chemical Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31107	Introduction to Nanotechnology	1	Elective	PST 11204, PST 12205, PST 22205
PST 31211	Mathematical Programming	2	Elective	

PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31216	Biochemistry – I	2	Compulsory	PST 11205
PST 31217	Electroanalytical Techniques	2	Compulsory	PST 11204, PST 12205
PST 31218	Industrial Chemistry and Technology - II (Inorganic)	2	Compulsory	PST 11204, PST 12206
PST 31219	Environmental Chemistry	2	Compulsory	PST 11204, PST 11205, PST 12206
PST 31220	Coordination Chemistry	1	Compulsory	PST 11204, PST 22204
PST 31121	Laboratory Quality Control and Assurance	1	Compulsory	PST 11106, PST 12206
PST 31122	Physical Chemistry Laboratory II	1	Compulsory	PST 11205, PST 21111
PST 31123	Analytical Chemistry Laboratory II	1	Compulsory	PST 12206, PST 22106, PST 22107
PST-EBP-3101	Business English	0	Compulsory	
	Total	**19**		

Table 13: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 15 credits)*

BSc Honours Degree in Computer Science & Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31210	Multimedia and Hypermedia Systems Development	2	Compulsory	
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31215	Agile Software Development	2	Elective	PST 22208
PST 31224	Artificial Intelligence & Expert Systems	2	Compulsory	PST 21207
PST 31225	Software Project Management	2	Compulsory	PST 22208
PST 31226	Software Quality Assurances	2	Compulsory	PST 22208
PST 31227	Object Oriented Analysis and Design	2	Compulsory	PST 12108
PST 31128	Computer Laboratory 3-I	1	Compulsory	PST 11109
PST 31229	Advanced Database Management Systems	2	Compulsory	PST 22218
PST 31230	Social and Professional Issues in Computing	2	Elective	
PST-EBP-3101	Business English	0	Compulsory	

	Total	**21**		

Table 14: Courses offered in the Semester II of the Third Year ***(A student must earn a minimum of 16 credits)***				
BSc Honours Degree in Applied Physics				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 32201	Statistical Physics	2	Compulsory	PST 12201
PST 32102	Interaction of Radiation with Matter	1	Compulsory	PST 11202, PST 22201
PST 32203	Atmospheric Physics	2	Compulsory	
PST 32104	Advanced Electronics	1	Compulsory	PST 21201
PST 32205	Solid State Devices	2	Compulsory	PST 21201
PST 32206	Astrophysics	2	Compulsory	PST 22116, PST 31209
PST 32207	Atomic and Molecular Spectroscopy	2	Elective	
PST 32108	Current Topics in Physics	1	Compulsory	PST 12102
PST 32109	Human Resource Management	1	Elective	
PST 32210	Statistics in Quality Control	2	Elective	PST21209, PST 22209
PST 32111	Physics Laboratory 3-II	1	Compulsory	PST 11103, PST 12103, PST 21103, PST 22103, PST 31108
PST 32212	Graph Theory	2	Elective	
PST 32213	Resource Efficient and Cleaner Production	2	Elective	
	Total	**21**		

Table15: Courses offered in the Semester II of the Third Year *(A student must earn a minimum of 16 credits)*				
BSc Honours Degree in Chemical Technology				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 32109	Human Resource Management	1	Elective	
PST 32210	Statistics in Quality Control	2	Elective	PST21209, PST 22209
PST32213	Resource efficient & Cleaner Production	2	Elective	
PST 32214	Chemistry of Drug Design and Drug Action	2	Compulsory	PST 11205, PST 21204, PST 11205
PST 32215	Polymer Chemistry & Technology	2	Compulsory	PST 12205, PST 21204

PST 32216	Surface and Colloid Chemistry	2	Compulsory	PST12205
PST 32217	Biochemistry II	2	Compulsory	PST 31216
PST 32118	Advanced Organic Chemistry	1	Compulsory	PST 11205, PST 21204
PST 32219	Introduction to Organic electronics	2	Elective	PST 12205, PST 22205, PST 31217
PST 32220	Structures and Properties of Solids	2	Compulsory	PST 11204
PST 32121	Advanced Inorganic Chemistry Laboratory	1	Compulsory	PST 11106, PST 12106
PST 32122	Biochemistry Laboratory	1	Compulsory	PST 31216
PST 32223	Organometallic Chemistry	2	Elective	PST 11204, PST 11205, PST 21204, PST 22204
	Total	**22**		

Table16: Courses offered in the Semester II of the Third Year *(A student must earn a minimum of 15 credits)*

BSc Honours Degree in Computer Science & Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32109	Human Resource Management	1	Elective	
PST 32210	Statistics in Quality Control	2	Elective	PST21209, PST 22209
PST 32212	Graph Theory	2	Elective	
PST 32224	Artificial Neural Networks	2	Compulsory	PST 31224
PST 32225	Digital Image Processing	2	Compulsory	
PST 32226	Data Mining and Applications	2	Compulsory	
PST 32227	Data Communication and Computer Networks	2	Compulsory	
PST 32228	Computer Graphics and Visualization	2	Compulsory	
PST 32229	Project in Computer Science and Technology (Mini Project)	2	Compulsory	PST 12108, PST 22208, PST 31227
PST 32130	Computer Laboratory 3-II	1	Compulsory	PST 31128
PST 32231	Human Computer Interactions	2	Elective	
PST 32232	Bioinformatics	2	Elective	
PST 32133	Current Topics in Computer Technology	1	Elective	
	Total	**23**		

Table 17: Courses offered in the Semester I of the Fourth Year (*A student must earn a minimum of 19 credits)*

BSc Honours Degree in Applied Physics

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 41201	Research Methodology and Scientific Communication	2	Compulsory	
PST 41202	Computational Physics	2	Compulsory	
PST 41203	Robotics	2	Elective	
PST 41204	Remote Sensing & GIS	2	Compulsory	PST 32203
PST 41205	Geophysics	2	Compulsory	
PST 41206	Medical and BioPhysics	2	Compulsory	
PST 41207	Advanced Nanotechnology	2	Elective	
PST 41208	Data Acquisition and Signal Processing Methods	2	Compulsory	PST 21201
PST 41209	Advanced Laser Physics	2	Elective	
PST 41210	Automation	2	Elective	
PST 41211	Astronomical Instruments and Data Reduction & Analysis Techniques	2	Compulsory	PST 32206
PST 41212	Electrochemical Power Conversion	2	Elective	
PST 41013	Literature Search Seminar in Applied Physics	0	Non credited Compulsory	
PST 41014	Independent Research / Project in Applied Physics	0	Non credited Compulsory	
PST 41215	Industrial Management	2	Elective	
PST 41216	Classical Mechanics	2	Compulsory	PST 11201, PST 11210, PST 22215
PST 41235	Critical Thinking	2	Elective	
	Total	**30**		

Table 18: Courses offered in the Semester I of the Fourth Year (*A student must earn a minimum of 22 credits)*

BSc Honours Degree in Chemical Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST41201	Research Methodology and Scientific Communication	2	Compulsory	
PST41207	Advanced Nanotechnology	2	Elective	PST 41107
PST41212	Electrochemical Power Conversion	2	Elective	PST 11204, PST 12205, PST 21111, PST 31122, PST 31217
PST41215	Industrial Management	2	Elective	

PST41217	Natural Products Chemistry	2	Compulsory	PST 11205, PST 21204
PST41218	Biotechnology	2	Compulsory	PST31216, PST32122
PST41219	Advanced Solid-State Chemistry	2	Compulsory	PST 11106, PST 32220
PST41120	Bioinorganic Chemistry	1	Compulsory	PST 11204, PST 31216
PST41221	Instrumental Analysis	2	Compulsory	
PST41222	Applied Molecular Modelling	2	Elective	PST 11204, PST 11205, PST 21204, PST 22205
PST41223	States of Matter	2	Elective	PST11204, PST 21204, PST 22205
PST41124	Literature Search in Chemistry	1	Compulsory	
PST41225	Independent Research / Project in Chemical Technology	2	Compulsory	
PST41226	Computer Applications in Instrumentation	2	Elective	
PST41235	Critical Thinking	1	Elective	
	Total	**27**		

Table 19: Courses offered in the Semester I of the Fourth Year (*A student must earn a minimum of 16 credits)*

BSc Honours Degree in Computer Science & Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST41201	Research Methodology and Scientific Communication	2	Compulsory	
PST 41203	Robotics	2	Elective	
PST 41215	Industrial Management	2	Elective	
PST 41227	Web services	2	Compulsory	PST 21110
PST 41228	Computer System Security	2	Compulsory	
PST 41229	Advanced Computer Networks	2	Compulsory	PST 32227
PST 41230	Internet of Things (IoT)	2	Elective	
PST 41231	Natural Language Processing	2	Elective	
PST 41232	Cloud Computing	2	Compulsory	PST 31229
PST 41233	Business Process Management Systems	2	Elective	
PST 41234	Mobile Computing	2	Elective	
PST 41235	Critical Thinking	2	Elective	
	Total	**24**		

Table 20: Courses offered in the Semester II of the Fourth Year (*A student must earn a minimum of 11 credits)*				
BSc Honours Degree in Applied Physics				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 42801	Project Work (Industrial Exposure) : BSc Thesis in Applied Physics	8	Compulsory	PST 11103, PST 12103, PST 12103, PST 21103, PST 22103, PST 31108, PST 32111
PST 42102	Literature Search Seminar in Applied Physics	1	Compulsory	PST 11103, PST 12103, PST 12103, PST 21103, PST 22103, PST 31108, PST 32111
PST 42203	Independent Research / Project in Applied Physics	2	Compulsory	PST 11103, PST 12103, PST 12103, PST 21103, PST 22103, PST 31108, PST 32111
	Total	**11**		

Table 21: Courses offered in the Semester II of the Fourth Year (*A student must earn a minimum of 08 credits)*				
BSc Honours Degree in Chemical Technology				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 42804	Project Work (Industrial Exposure): BSc Thesis in Chemical Technology	8	Compulsory	
	Total	**8**		

Table 22: Courses offered in the Semester II of the Fourth Year (*A student must earn a minimum of 14 credits)*				
BSc Honours Degree in Computer Science and Technology				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 41805	Project Work: BSc Thesis in Computer Science & Technology *	8	Compulsory	
PST 42606	Industrial Training	6	Compulsory	
	Total	**14**		

** The Independent Research Project will be offered as an annual course unit in both semesters I and II, with a total value of 8 credits. Students will be evaluated through regular progress presentations from Semester I to the end of the Semester II.*

Summary of credits offered:

The minimum number of credits required for a BSc degree in Physical Sciences in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	17(18)	20	37(38)
Year III	16	08	24
Total			**93(94)**

The minimum number of credits required for BSc Hons degree in Applied Physics in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	17	20	37
Year III	17	16	33
Year IV	19	11	30
Total			**132**

The minimum number of credits required for BSc Hons degree in Chemical Technology in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	18	20	38
Year III	14	16	30
Year IV	22	08	30
Total			**130**

The minimum numbers of credits required for BSc Honours in Computer Science and Technology in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	17	20	37
Year III	15	15	30
Year IV	16	14	30
Total			**129**

Detailed Syllabus

N.B.

T - Theory
P - Practical
F - Field visit relevant to the particular subject area.
TH - Thesis

Year I Semester I				
PST 11201	Mechanics and Properties of Matter	T		
Displacement, velocity and acceleration, vectors and vector operation, projectile motion and relative velocity, Newton's laws, circular motion: centripetal force, friction and work, energy: kinetic, potential and conservation, power, liner momentum and collisions, center of mass and moment of inertia, circular motion: equations of motion, circular motion: torque, angular momentum, energy, law of gravitation, elasticity and viscosity, surface tension				

PST 11202	Introduction to Electricity and Magnetism	T		
Electricity Introduction to Electricity, First Law of Static Electricity, Coulomb Law, Electric Intensity, Concept of Electric Field & Line of Forces, Various Type of Electric Fields (one & two point charges), Electric Field of Continuous Charge Distributions, Gauss' Law, Application of Gauss' Law (sphere of charge, spherical shell of charge, infinite line charge and a uniform sheet of charge), Electric Potential due to (point charge and continuous charge distribution), Capacitors & Dielectrics, Energy Stored in Electric Field, Electric Dipole Moment, Method of Images, Current & Current Density, Drift Velocity, Resistance, Resistivity & Conductivity **Magnetism** Magnetic Field, Lorentz Force, Hall Effect, Torque on a Current Loop, Motors, Magnetic Dipole, Biot–Savart Law & its Application, Ampere's Law, Solenoids & Toroids, Faraday's Law of Induction, Lenz's Law, Motional emf, Dynamos, Induced Electric Fields, Betatron, Gauss' Law for Magnetism and Atomic & Nuclear Magnetism				

PST 11103	Physics Laboratory 1-I		P	
Mechanics, Thermal Physics, Geometrical Optics, Waves, Electricity and Magnetism				

PST 11204	General Chemistry	T		
Review of classical atomic theory, (Atoms and molecules, Orbital, Pauli exclusion principle, De Broglie relationship, Heisenberg's uncertainty principle, Schrödinger equation), Atomic spectra, Sub-atomic particles, Chemical bonds (Covalent bonds, Intra- and inter-molecular forces), Lewis theory, Valence bond theory, Molecular orbital theory, Shapes of molecules from VSEPR theory, Hybridisation. Size and energy factors in Chemistry, Born - Haber cycle, Oxidation-reduction reactions, Concepts of acid-base, Redox reactions, Nernst equation and applications of electrode potential data. Balancing chemical equations and Half-reactions				

PST 11205	Fundamentals of Organic Chemistry	T		
Inter- and intra-molecular interactions of organic molecules, Principles of resonance, Hybridization, Conjugation, Polar effects, Steric effects, IUPAC Nomenclature of organic compounds, Aliphatic and aromatic compounds, Acidity and basicity of organic compounds, Stereochemistry (Stereoisomerism; Optical & geometrical isomerism, Absolute and relative configurations, Substitution and elimination reactions, Reactions of free radicals, carbocations and carbanions)				

PST 11106	Inorganic Chemistry Laboratory I		P	
Qualitative analysis: Analysis of inorganic anions, Cations and their mixtures. Quantitative inorganic analysis by volumetric titrations, Apparatus and measurements, Error analysis, Introduction to analytical methods.				

PST 11107	Structured Programming	T		
Introduction to Structured Programming: Introduction to compilers and interpreters, Pseudo code, Data types, Variables, Expressions and Assignment Statements, Console Input/output, Libraries. Flow Control: Branching Mechanisms, Loops. Function Basics: Predefined Functions, User-Defined Functions, Scope Rules. Parameters: Parameters, Default Arguments. Arrays: Introduction to Arrays, Array manipulation, Multidimensional Arrays. Structures: Structures. Pointers: Pointers. Recursion: Recursive functions. Exception Handling: Testing and Debugging, File Handling.				

PST 11208	Computer Hardware and Software	T	P	
History of Computers: The First Generation: Vacuum Tubes, The Second Generation: Transistors, The Third Generation: Integrated Circuits, Later Generations; Classification of Computers: Classification based on Size, Functionality, and Data Handling; Motherboard: Motherboard Types and Features, Motherboard Form Factors, Processor Sockets, Chipset, Buses and Expansion Slots, On-board Ports and Connectors; Processor: Types and Characteristics of Processors, How a Processor Works, Intel Processors, AMD Processors; Memory: Computer Memory System Overview, Cache Memory Principles, Internal Memory, External Memory; Hard Drive: Hard Drive Technologies and Interface Standards, Technologies Used Inside a Hard Drive, Interface Standards used by a Hard Drive; Input/ Output Devices: Ports and Wireless Connections Used by Peripheral Devices, I/O Peripheral Devices, Adapter cards, Video Subsystem; Storage Devices: File Systems Used by Storage Devices, Standards Used by Optical Drives and Discs, Solid State Storage; Software: Systems Software, Application Software, Software Issues and Trends; Networking Types, Devices, and Cabling: Network Types and Topologies, Hardware used by Local Networks.				

PST 11109	Computer Laboratory 1-I		P	
Introduction to Programming and C Language with IDE, Libraries and Namespaces, Data types and Variables, Constants and Literals, Operators and Expressions, Input/Output Operators, Control Statements and Decision Making, Arrays:				

Introduction to Arrays, Array manipulation and Multidimensional Arrays, Strings, Pointers: Basics of Pointers, Pointers and One-dimensional Arrays, Null pointers, Pointers and Strings, Structures and Unions: Basics of Structures, Arrays of Structures, Pointers to Structures, and union, Functions: Predefined Functions, User-Defined Functions. Scope Rules, Recursion, Dynamic Memory Allocation: Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory and Reallocating Memory Blocks, File Management: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Random Access to Files, Command Line Arguments.

PST 11210	Calculus and Differential Equations	T		

Calculus: Sets, Relations, Functions, limits (right hand limit and left hand limit), continuity and differentiability, Coordinate systems (2D and 3D),Partial derivatives and chain rule, Differential Equations: Basic concepts – Introduction, Ordinary and partial differential equations, Classification of ordinary differential equations, Applications, Simple Harmonic Motion, Simple Pendulum, General form and solution of a differential equation, Formation of a differential equation, Linear and non-linear differential equations, Initial value problem, Boundary value problem, Differential equations of the first order and first degree, Separation of variables, Homogeneous equations, Method of solving homogeneous equations, Linear differential equations, Bernoulli's equation, Exact differential equations, Equations reducible to the exact form.

PST-EGP-1101	General English I	T		

https://www.sab.ac.lk/app/eltu-curriculum

Year I Semester II				
PST 12201	Physics of Heat and Waves	T		

Waves and Vibrations

Simple Harmonic Motion (SHM): Properties, Mathematical Representation, Energy of a SH Oscillator, examples of SHM, Damped Harmonic Motion, Forced Oscillations, Application of SHM in Mechanical and electrical systems, Propagation of Waves in Strings, Linear Wave Equation, Principle of Superposition, Standing Waves in Stings and in Air Columns, Interference of Waves, Beats, Sound waves in Media, Doppler Effect, Shock Waves

Thermal Physics

Concept of Temperature, Zeroth Law of Thermodynamics, Temperature Scales, Thermal Expansion, Internal Energy and Heat, Specific Heat, Latent Heat, Calorimetry, Work Done by a Gas, First Law of Thermodynamic, Application of the First Law of Thermodynamics, Energy Transfer Mechanisms, Kinetic Theory of Gases, Phase Diagrams and Critical Points, Drift & Diffusion Velocities, Specific Heat of Gases, Distribution of Molecular Speeds, Heat Engines and Second Law of Thermodynamic, Carnot Engine, Entropy

PST 12102	Semi-Conductor Physics	T		
Free electron theory, Density of states, Fermi energy, Electrical conduction in metals, Band theory, Conductors Insulators & Semiconductors, Intrinsic & extrinsic semiconductors, Diffusion & drift current, mobility & conductivity of charge carriers, Abrupt & Smooth p-n junction (Depletion region, built in electric field, contact potential, density of majority & minority charge carriers, depletion capacitance), biasing of p−n junction, The rectifying diodes, The breakdown in p−n junction (Avalanche & Zenner), Homo junction Schottky Junction & Hetero junction, pnp & npn bipolar transistor, Photo diodes, Light emitting diodes (LED) and Introduction to Solar cells				

PST 12103	AC Theory & Circuits	T		
Alternating currents; Sinusoidal waveform; Resistors, capacitors & their colour coding; Thevenin's theorem & its application to complicated circuits; Delta & Star transformations of resistor networks; Resistors capacitors & inductors in a.c. signal; A.C. transients in CR & RL; Energy in inductor; LC oscillations, Damped oscillations, Analysis of LCR a.c. circuits using Trigonometric analysis, Phasor diagram & Complex representation; Impedance & Resonance in LCR circuits; Power and Power factor; Transformer; and Filter circuits & band width				

PST 12104	Physics Laboratory 1-II		P	
AC Circuits, Semiconductor Physics, Geometrical Optics, Electricity & Magnetism, Basic Electronics and Introduction to Computer Sensors				

PST 12205	Fundamentals of Physical Chemistry	T		
Properties of gases: The perfect gas, Gas laws, Kinetic model of gases, Real gases and their behaviour, Van der Waals equation of state. Thermodynamics: First law, Expansion work, The internal energy, Enthalpy, Thermochemistry, Adiabatic changes, Entropy, Second & Third laws of thermodynamics, Statistical entropy, Gibbs free energy, Chemical potential and mass action law, Thermodynamics of Electrochemical Cells. Chemical kinetics: Rate laws, Rate constant, Order of a reaction, Integrated rate laws of zeroth, first and second order reactions, Arrhenius equation, Steady State Approximation.				

PST 12206	Fundamentals of Analytical Chemistry	T		
Introduction to chemical analyses, Sampling methods, Types of errors, Error analysis, Statistical treatment of analytical data, Introduction to classical methods; Titrimetric analysis (Acid–base, Complexometric, Gravimetric etc.), Electromagnetic spectrum, Introduction to spectroscopic methods (UV-visible, AAS, Emission spectroscopy), Solvent extraction, Principles of separation techniques (solvent-solvent, solvent-solid, solid-solid, Calibration methods (External & internal standard methods and standard addition).				

PST 12107	Organic Chemistry Laboratory I		P	
Laboratory Safety, Physical nature of organic compounds, acid base properties and solubility competitive, Beilstein Test, Preparation of Lassaigne's fusion extract.				

Functional group analysis, unsaturated organic compounds, alkyl and aryl halides, alcohols (primary, secondary tertiary), aldehyde and ketones, , phenols, carboxylic acid and their derivatives, (amides, esters, ammonium salts) amines, carbohydrate analysis

PST 12108	Object Oriented Programming	T		
Introduction to OO Concepts: Abstraction, Encapsulation, Inheritance and Polymorphism. Introduction to OOP: class, object, interfaces, packages, methods, constructors, objects creation, and method invocation. Encapsulation; class member visibility (private, public, protected, default), static members, abstract classes and abstract methods. Inheritance and Polymorphism: subclasses, inheritance and class hierarchies, dynamic binding. Applications of OO concepts to solve real life problems				

PST 12209	Fundamentals of Statistics	T		
Introduction to statistics; Types of data and presentations, Data collection methods, Population and sample, Sampling techniques, Descriptive statistics: Data presentation and Summary measures. Measure of central tendency, measure of variability and dispersion, Elementary Probability: Elements of probability, Different approaches of probability, Elementary properties of Probability, Calculating the probabilities of simple and complex events, Conditional probability and Bayes' theorem, Random variables and Probability Distributions: Properties of Probability distributions. Special Probability Distributions: Discrete; Bernoulli, Binomial, and Poison. Continuous; Uniform, Normal, and Exponential Introduction to statistical software: Data management and familiarize with the common statistical functionalities; Entering, Summarizing, Presenting and Describing the data				

PST 12110	Computer Laboratory 1-II		P	
Introduction to Java: History of Java, Features of Java, Java Development Kit (JDK), Java Basics: Keywords; Working of Java; Data Types, Variables, Using Classes and object in Java, Declaring Methods in Java, Operators and Control Statements, Compiling and Executing Java Program. Introduction to OOP and its basic features, Access Control, Exceptions Handing, Arrays and Strings, OOP Concepts: Encapsulation, polymorphism, Inheritance, Aggregation and Abstraction, Constructors and Destructors, Memory Management, Using API libraries in Object Oriented Programming				

PST 12211	Database Management Systems	T	P	
Introduction to Databases: Definition of the database, database system, data models, database applications, database system architecture, characteristics of database approaches, Designing: Conceptual design: ER- diagram: Relational Model, Constraints, ERD Issues, weak entity sets. Logical design: Relational database model, Logical view of data, keys, integrity rules, Normalization. Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics, Operators, Grouping and ungrouping, relational, Triggers. Database programming: SQL, DDL, DML. Database tuning and indexing				

PST-EGP-1201	General English II	T		
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Year II Semester I				
PST 21201	Electronics	T		

Diodes (biasing, DC & AC resistance, equivalent circuit, load line analysis, half & full wave rectification, clippers, clampers, voltage multiplier circuit & diode testing), Bipoler transistors (Operation, configuration, characteristics, testing, biasing methods, load line analysis, switching net work, r_e model & the hybrid equivalent model), BJT Frequency Response, Feedback, Oscillators, Operational amplifiers (inverting, non-inverting), Basic OP-Amp circuits, Applications of OP-Amp, Binary decimal octal & hex number systems, Logic gates, Logic expressions & its simplifications using Boolean algebra and k-Maps, De Morgan's theorem, Combinational logic circuits (Full adder), Sequential logic circuits, Introduction to Flip-Flops (S-R, J-K, D, and Master-Slave), Shift Registers, Asynchronous & Synchronous Counters, Decoders (BCD to Decimal, BCD to Seven Segment), Encoders, BCD Code & ASCII Code, Multiplexer, Analysis of Sequential Logic Circuits, Transition Tables, Sequential Circuit Design, Excitation Tables

PST 21202	Geometrical & Physical Optics	T		

Geometrical Optics

Graphical ray-trace method, Key rays used in ray tracing, Reflection, Reflection law, Mirror formulas for image location, Sign convention, Magnification of a mirror image, Refraction, Snell's law, Refractive index, Prisms and their properties, Refraction at curved surface, Function of a lens, Types of lenses, Image location by ray tracing, Lens formulas for thin lenses, Power of a lens, Optical Instruments (Telescope, Microscope)

Physical Optics

Huygens Theory, Laws of Reflection and Refraction by Huygen's theory, Electrical and Magnetic Constants and Speed of Light, Solution to the Wave Equation, Interference, Principle of Superposition, Young's Double Slit Experiment, Michelson's Interferometer, Newton's rings, Resolving Power of an Interferometer, Diffraction, Fresnel Diffraction, Fraunhoffer Diffraction, Dispersion, Polarization, Scattering, Absorption

PST 21103	Physics Laboratory 2-I		P	

AC Circuits, Semiconductor Physics, Geometrical Optics, Physical Optics, Electronics and Computer Sensors

PST 21204	Organic Chemistry	T		

Alkyl halides, **and Alcohols** Nucleophilic substitution reaction, S_N1, S_N2 and S_Ni mechanisms. Elimination reactions E1 and E2 mechanisms in detail E1/ S_N1 and E2/ S_N2 reactions

Aromatic compounds, molecular orbital description of benzene Aromaticity, Frost Diagrams, Hückel's rules, aromatic, antiaromatic and non-aromatic compounds, reactions of benzene, electrophilic aromatic substitution, halogenation, nitration, sulfonation, alkylation, acylation, reactions of substituted benzene, orientation in

electrophilic substitution, Phenols and aryl halides, nucleophilic aromatic substitution reactions

Carbonyl compounds Structure and reactivity (nucleophilic addition reactions, keto-enol isomerism, alpha-substitution reactions, aldol condensation reactions) of aldehydes and ketones, Conjugated enones, 1,2- vs 1,4-additions, Carboxylic acids and their derivatives, Nucleophilic acyl substitution reactions, **Chemistry of aliphatic amines and aryl amines**

PST 21205	Industrial Chemistry and Technology I (Organic)	T		

Introductions to the importance of chemical processes used in industry and to the aspects of R&D in the industry. Industrial organic chemistry, Plantation crop industries, Coconut, Tea, Sugar cane, Chemistry of essential oils, Oils and fats, Edible margarine industry, Detergents, Petroleum products and biofuels, Organic dyes, Pesticides, Tannery industry

PST 21106	Organic Chemistry Laboratory II		P	

Organic chemistry (recrystallization, Separation of Binary mixtures, (Acid / base/neutral), solvent extraction, Synthesis of organic compounds (acetanilide, benzanilide, dibenzalacetone, acetyl salicylic acid, benzoin, acetaminophen etc), extraction of natural products (caffeine from tea, trimyristine from nutmeg, piperine from black pepper etc) Synthesis of industrially important products (soap, nylon etc , Chromatography)

PST 21207	Data Structures & Algorithms	T		

Data Types (Simple and Compound data types, The realization in the Standard Language chosen for Study),Data Structure(Strings, Arrays and Tables, Stacks and Queues, Linked Lists, Binary Trees and Balanced Binary Trees, Splay Trees), File Organization and Access (Sequential organization, Random Organization, Linked Organization, Inverted les and Databases, Sort and Search Algorithms (Searching – Sequential Search, Binary Search, Sort: Bubble Sort, Insertion, Selection, Quicksort, 2-Way Merge Sort), Consideration of the efficiency of Algorithms in terms of Time and Space.

PST 21208	Computer Architecture and Assembly Language	T		

Basic Structure & Components of a Computer System, Difference in Computer Organization & Computer Architecture, Computer Evolution, Study of Different Microprocessors, Interconnection Structures, Memory Organization, Data Representation, Instruction Set, Processor Structure &Function, Instructions and instruction codes, Instruction cycle, Interrupts, Performance, Processor Registers, Address Segmentation, I/O Schemes, System Support Devices, Programming in 80x86 Assembly Language

PST 21209	Statistics for Experimental Analysis	T	P	

Estimation: Point and Interval Estimation for measures of centre (mean) and measures of dispersion (variance). Hypothesis Testing: Concepts of Hypothesis testing, single

sample tests, two sample tests (dependent and independent). Introduction to design of experiments: simple and comparative experiments, factors and treatments, randomization, replication, blocking, balanced and unbalanced designs, fixed effects and random effects. Introduction to Analysis of Variance (ANOVA): Assumptions and Basis of F – test. One-way ANOVA and two-way ANOVA. Multiple comparison analysis testing in ANOVA. Special Experimental Designs: Complete Randomized Design (CRD), Randomized Complete Block designs (RCBD), Latin Square and Graeco-Latin Square Design.
Mean comparisons methods, Two factor factorial with CRD and RCBD, Introduce statistical software, Analysis of the real world data by using statistical software and result interpretation.

PST 21110	Computer Laboratory 2-I		P	

Introduction to the Web: Internet, Browsers, Clients, Introduction to HTML: HTML tag syntax, Basic HTML tags (text, fonts, colors, images, lists, tables, frames, forms), Introduction to CSS: Basic CSS for text formatting, Working with Layout ,Working with Images in CSS, Introduction to JavaScript: Basic Syntax Used in Java Script ,Variables, Operators, Functions ,Flow Control Structures ,Events, Arrays, JavaScript inside a browser, DMO, jQuery, Introduction to PHP: PHP Basics, Data Types, Flow Control ,String Manipulation, Use of Array, Functions: Introductions to Functions, HTML Form Processing: HTML Form Basics, GET Method, POST Method, Client Side form Validation (Using JavaScript), File Manipulation: Directory Manipulation, File Uploading, Session & Cookies: Server Variables, Use of Sessions & Cookies, Application development using sessions and cookies, Introduction to MySQL RDBMS, MySQL with PHP: Connecting PHP to MySQL, Working with MySQL, Advanced PHP form processing with PHP/MySQL

PST 21111	Physical Chemistry Laboratory I		P	

Treatment of experimental data: Presentation of data and error analysis. Experiments in physical chemistry: Gas laws, Thermochemistry, Chemical kinetics, Colligative properties, Phase diagrams, Surface Phenomena, UV-Visible spectroscopy, Vibrational spectroscopy,
Conductometric and pH titrations, Electrochemistry.

PST-EAP-2101	Academic English I	T		

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Year II Semester II				
PST 22201	Physics of Electromagnetic Radiation and the Introduction to the Laser	T		

Physics of Electromagnetic Radiation:
Cathode Ray Oscillograph, Aston's Mass Spectrograph, Betatron, Magnetization, Electron Spin, Introduction to Magnetic Material (Paramagnetism, Diamagnetism & Ferromagnetism), Magnetism of Planets, Diamagnetism & Langevin's Classical Theory, Paramagnetism & Langevin's Classical Theory, Quantum Theory & Paramagnetism,

Weiss Theory of Ferromagnetism, Concept of Domains and Hysteresis, Maxwell Equations, and Electromagnetic Waves

Introduction to the Laser

Historical Development, Principle of Coherence Spatial, Temporal & Partial, Coherence, Methods of Measuring Temporal & Spatial Coherence, The Density of Modes, Mode in a Reflecting Volume, Longitudinal Modes in a Laser Resonator, Transverse Modes in a Plane-parallel Resonator, Interaction of Light with Matter Processes of Spontaneous Emission, Absorption and Stimulated Emission, Radiative Energy Exchange, Einstein Coefficients, Transmit of Light Beams through a Material Medium, Process of Excitation & Attenuation, Gain Saturation, Oscillation Threshold, and Population Inversion Basic Laser Systems 2-level, 3-level and 4-level Systems Brief Discussion of the Diversity of Laser Applications

PST22202	Quantum Physics, Atomic and Nuclear Physics	T		

Bohr Theory of the Hydrogen Atom, Atomic Spectra, Orbital Angular Momentum, Magnetic Dipole Moment, Spin, Pauli Exclusion Principle, Space-time, Mass Energy and Momentum in Relativity, Planck's Hypothesis, Photo Electric Effect, Compton Effect, De Brogile Waves, Heisenberg's Uncertainty principle, Schrodinger's wave equation, Atomic Nucleus Binding Energy, Models of the Nucleus, Liquid Drop, Shell Model, Decay of Unstable Nuclei (α,β,γ-decay),), Fission and Fusion, Nuclear Reactions, Elementary Particles

PST 22103	Physics Laboratory 2-II		P	

AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino

PST 22204	Chemistry of Elements	T		

Main group chemistry (General and systematic chemistry of the groups of elements), s-block elements (physical and chemical properties of the alkali metals and alkaline earth elements), p- block elements (Physical and chemical properties of group 13 – 18 elements), An introduction to d-block & f-block elements and their applications.

PST 22205	Physical Chemistry	T		

Quantum Mechanics: Revision of evidence for quantization, Dynamics of microscopic systems, Schrödinger equation, Quantum mechanical principles: Operators and observables, Superposition and expectation values, the uncertainty principle, Solution of the Schrödinger equation for particle in a one-dimensional box, 2-dimensional box, 3-dimensional box.

Phase Equilibria:

One component system, Miscible, partially miscible & immiscible liquid mixtures, Condensed phases, Eutectic systems and compounds formation, Partially miscible systems, Solid solutions, Simple three component systems, Distillation of liquid mixtures (Congruent and non-congruent).

PST 22106	Inorganic Chemistry Laboratory		P	

Gravimetric analysis, Determination of anions and cations by gravimety,

Complexometric titration including EDTA, Synthesis of inorganic complexes and their analysis, Qualitative analysis of simple mixtures, Analysis of rare elements, Insoluble mixtures, Synthesis of special inorganic compounds.

PST 22107	Analytical Chemistry Laboratory I		P	
Synthesis & analysis of coordination compounds., Colorimetric analysis, Chromatography Determination of water quality parameters , Soil, and Air quality etc				

PST 22208	Software Engineering	T		
Introduction to Software Engineering, Introduction to problems, Software Processes, Requirements and Specification, Software design, COTS and Reuse, CASE Tools, Metrics and Reliability Assessment, Software Testing and Quality Assurance (Testing, Analysis, QA, Reviews), Implementation Models, Team Organization and People Management, Software and System Safety, Putting It All Together				

PST 22209	Statistical Methodology	T		
Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties, tests for regression coefficients, tests for significance of the fitted model (ANOVA), model adequacy checking and remedial measure, Models with qualitative independent variables (Dummy variables) and model selection procedures Nonparametric statistical methods; Scale of Measurements, Single sample tests; Sign and Wilcoxon Signed Rank Test, Two Sample tests; Wilcoxon Matched Paired Signed Rank test, Wilcoxon Rank Sum Test, The Kruskal-Wallis One-Way Analysis of Variance by Ranks, and Friedman Two-Way Analysis of Variance by Ranks, Rank Correlations (Spearman's and Kendall Tau) Analysis of Count Data: Chi-squared test of goodness of fit, Introduction to time series analysis and Forecasting; Components of Time Series data, Smoothing methods, Forecasting methods, Analysis of real world data using statistical software and interpretation of results.				

PST 22110	Computer Laboratory 2-II		P	
Introduction To **C#;** Introducing C#, Understanding .NET, overview of C#, Base Class Library, Namespaces, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, Constant, Arrays, String. Object Oriented Aspects of C#, Application Development on .Net; Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, Windows application configuration. Deploying windows Applications, Web Based Application Development on.Net; ASP.NET introduction, Creating Virtual Directory and Web Application, Introduction to Configuration files, Session management techniques, Data Validation with Regular Expressions, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.				

PST 22211	Operating Systems	T		
Overview, Operating system principles, Multi-Programming: Processes and threads, system calls, context switching, Managing processor time. Types of scheduling, Scheduling algorithm, concurrency, Memory management, Device management, File systems, Inter-process Communication: pipes, sockets, signals, shared memory, security and protection, real time and embedded systems, fault tolerance, system performance and evaluation. Case study: Linux.				

PST 22112	Leadership and Communication	T	P	
Definition of leadership, power and leadership, importance of leadership, leadership qualities, leadership behaviours and approaches, different types of leaders, leadership in practice; definition of team and team work, building an effective team, stages of team building, different team roles, obstacles to team effectiveness; definition of communication, the communication process; effective listening skills, elements of an effective presentation, non-verbal communication, email etiquettes & phone etiquettes.				

PST 22213	Biology for Physical Sciences	T		
Cell and its constituents, Cellular water relations, Protein Synthesis, Introduction to enzymes, Principles of genetics, Composition of living matter, Structure and characteristics of animal tissues				

PST 22114	Soft Skill Development	T	P	
Listening to a talk and basic interpersonal skills, basics of giving a talk, preparing slides for a presentation, writing an article, conveying information, reading skills, debating, acting, how to have a conversation, how to face an interview, presenting an argument, "Political correctness"				

PST 22215	Mathematical Methods	T		
Complex Numbers: Introduction, Real and Imaginary Numbers, The Algebra of Complex numbers, Complex Number Operation, Polar form of the complex number. Matrices and determinants: Matrices and system of linear Equations, Operations with Matrices, Determinant of a Square Matrix, Inverse of a Square Matrix, Applications of Matrices and Determinants. Vectors: Vectors and Scalars, Vector Algebra, lineally independence and linearly independence, Vector Fields, Dot and Cross product, Reciprocal sets of Vectors, Vector differentiation, Gradient, Divergence, Vector integration. Fourier Series: Periodic functions, Function having arbitrary period, Even and odd functions, Half-range expression, Convergence of Fourier series, Operation on Fourier Series Fourier Transforms: Fourier's integral theorem, Fourier cosine and sine transforms, Fourier transforms of derivatives, Calculation of the Fourier transforms of some simple functions, Fourier transforms of some rational functions Laplace Transforms: Inverse functions, Linearity, Laplace transforms of derivatives and integrals, Shifting on the s-axis ,Shifting on the t-axis, Unit step functions, Differentiation and Integration of the transforms.				

PST 22116	Introduction to Astronomy	T		
Introduction about the difference in astronomy, cosmology, and astrophysics,				

Comprehensive study about the ancient astronomy, geocentric model, Copernicus heliocentric model, Tycho Brahe's observations, Kepler and the orbits of planets, Gallio and telescope observation, Newton laws of motion, Newtonian gravity etc., Introduction to celestial sphere, Brief introduction about the Sun and its structure, planets and the solar system objects such as asteroids, comets etc, Natural astronomical phenomena such as solar eclipse, lunar eclipse, phases of moon, planetary conjunctions, oppositions etc., low and high tides, planetary conjunctions, planetary oppositions, planetary transits, meteorites and meteor showers

PST 22217	Industrial Metrology	T		

Basic units of measurements

Historical Background, Base Units, Derived units, Decimal multiples and sub multiples, Recommendation for writing SI unit names and symbols, Non SI units, other units

Fundamental concepts

Measurand and Influence quantities, True Value of a quantity, Nominal value, conventional true value, Error and relative error, Random errors, Systematic errors, Accuracy and precision, Calibration, Hierarchy of measurement standards, Traceability, Resolution, Discrimination and sensitivity, Reproducibility of measurements

Measurement equipments

Standard equipments and industrial measurement equipments in various fields such as Temperature, Mass, Dimensional, Electrical, Pressure and force

Calibration Methods

Temperature: (Thermometer, Oven, Incubator, Autoclave)
Mass: (Balance)
Dimensional: (Vernier caliper, Micrometer, Dial gauge, Height gauge)

Estimation of combined uncertainty of measurements

PST 22218	Management Information Systems	T		

Management within the organization: Management activities, Roles and Levels; Management Planning, Controlling and Strategic planning, Decision making and using MIS: Measurement of MIS performance and capabilities, MIS applications and relationships: Introduction to different types of Information Systems, Databases and data warehouses and their relevance to MIS; Networks, Internet and MIS.

Development of MIS: Managing MIS Project, Techniques and methodologies for supporting MIS development, Customer Relationship Management (CRM) and Supply Chain Management (SCM), Financial Systems and E-Commerce, Business Process Redesigning using new trends in MIS (ERP, Mobile and Cloud enabled MIS etc.)

PST 22219	Molecular Spectroscopy	T		

Rotational spectroscopy: Rigid diatomic rotator, Boltzmann distribution, Effect of isotopic substitution, Non-rigid diatomic rotator. Rotational fine structure, Vibrational Spectroscopy: Simple harmonic oscillator, Zero point energy, Anharmonic oscillator, Fundamental band and overtones, Hot bands, Diatomic vibrating rotator, Rotational fine structure. Raman spectroscopy. Electronic spectroscopy: Born–Oppenheimer approximation, Frank-Condon principle, Absorbance, Fluorescence. NMR spectroscopy: ^{1}H-NMR and ^{13}C-NMR spectra. Mass spectrometry: Elemental composition, Electron

impact ionization, Chemical ionization, Fragmentation mechanisms. Application of these spectral methods for structure elucidation of organic molecules.

PST-EAP-2201	Academic English II	T			
https://www.sab.ac.lk/app/eltu-curriculum					

**One day training workshop on leadership, professional and skill development at an institution outside the University*

GENERAL DEGREE COURSE UNITS

Year III Semester I					
For BSc Degree in Physical Sciences (Majoring in Physics)					
PST 31201	Solid State Physics	T			
Crystal Lattice & Translation Vectors, Symmetry Operations, Type of Lattices, Bravais lattice, Lattice Directions and Planes, Miller index, Inter-planar Spacing, Packing density, Simple crystal structures (close & loose packed), X-Ray diffraction, Bragg's law, The Von Laue treatment, X-Ray diffraction methods (Laue's, Rotary crystal & Powder methods), Atomic scattering factor, Geometrical structure factor & its applications to crystals, Lattice vibrations (Mono-atomic Lattice & Diatomic Lattice), Phonons, and Various theories of lattice specific heat (Classical theory, Einstein's theory)					

PST 31202	Nuclear Physics and Application	T			
General Survey of Radioactive Decay, Radioactivity, Rutherford Scattering, Discovery of the Neutron, Stable and unstable nuclei, Degree of Instability (Radioactive Half Life), Radioactive equilibrium; Binding Energies of Nuclei in their Ground States; Semi Empirical Mass Formula; Systematic of Beta Decay, Fermi Theory of Beta Decay; Theory of Alpha Decay; Theory of Gamma decay, Electron Capture, Auger Effect, Experiments on the Neutrino; Liquid Drop Model; Nuclear Potential Well, Introduction to Shell Model; Magic Numbers; Energy levels of the Shell theory potential; Nuclear Reactions; Conservation Laws; Nuclear Fission; Induced Fission; Chain reactions; Cross-section and differential cross-section; Nuclear Reactors; Nuclear Fusion; Sun; Hydrogen Burning; Applications of Radioactivity in different fields; Biological effects of Radiation; Introduction to Particle Physics, Standard Model and relativistic kinematics					

PST 31203	Quantum Mechanics	T			
Brief History of Quantum Physics, Photoelectric Effect, Compton Scattering, Photons, Franck-Hertz Experiment, the Bohr Atom, Electron Diffraction, De-broglie Waves and the Wave-particle Duality of Matter and Light, Heisenberg's Uncertainty Principle, Time Dependant Schrödinger equation (T.D.S.E.), Klein–Gordian equation, Time Independent Schrödinger equation (T.I.S.E), Normalization, Discrete Spectrum of Energy, Continuous Spectrum of Energy, Application of (T.I.S.E) to solve some Simple Problems in Quantum Mechanics for a Free Particle and a Particle in One-dimensional					

Potentials (Square, Barrier, etc.) and in Three–Dimensional Potentials, Probability Current Density, Some Applications of the Tunnel Effect in Physics, Hilbert Space, "Ket" and "Bra" Vectors, Matrix Formulation of Quantum Mechanics, Mean Values

PST 31104	Material Physics	T		
Crystalline and Amorphous Solids, Space-Lattice and Primitive Cell, Bravais lattices, Crystal structures (BCC, FCC & HCP), Introduction to Miller indices, Point defects (Vacancy, Interstitial, Frenkel, Substitutional, Colour or F-Centres, Polarons), line imperfection (Edge Dislocation & Screw Dislocation), Burgers Vector and Burgers Circuit, Surface Defects (Grain Boundaries, Tilt Boundaries, Twin Boundaries & Stacking faults), Reciprocal Lattice concept and Ewald's sphere, Superconductivity, Sources of Superconductivity, Meissner Effect, Type I & Type II Superconductors, Super electrons, Cooper Pair, Normal Tunnelling and Josephson Effect, Isotope Effect & High-T_C Superconductivity			

PST 31205	Special Relativity	T		
Introduction, Michelson-Morley Experiment; Einstein's Postulates, Lorentz Transformations, Time Dilation & Proper Time, Simultaneity, Length Contraction & Proper Length, 4–Vectors, Space–Time Interval, Space – time Diagrams, Minkowski Diagrams, Relativistic Velocity Transformations, Thomas Precession, Relativistic Doppler Effect, Relativistic Mass and Energy, Momentum and Energy Transformations, Decay of Elementary Particles			

PST 31206	Optical Fiber & Telecommunication	T		
Classic communication methods and basic optics, structure of optical fibers, attenuation and pulse dispersion, parabolic-index-fibers and material dispersion, single mode fibers and parameters, fiber optic sensors, basics of fiber optic communication, types of fibers and dispersion in fiber optic communication, pulse code modulation and digital encoding, fiber optic sources and cable, fiber optic detectors			

PST 31107	Introduction to Nanotechnology	T		
Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Importance of One Billionth of a Meter, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nanotechnology in Nature, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM Scanning Tunnelling Microscopy (STM), and Atomic Force Microscopy (AFM),), Nanofabrication methods: Bottom-up and Top−down Approaches, Self-assembly, Introduction to Lithography			

PST 31108	Physics Laboratory 3-I		P	
AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino				

PST 31209	The Origin and Evolution of the Universe	T		
The expanding Universe emerged from a cataclysmic event called the Big Bang. The universe before recombination, Olbers's paradox, observable universe, the Cosmic Microwave Background and the universe before recombination, Primordial fireball etc, Hubble's law, Hubble diagram, cosmological redshift, cosmological constant, the Plank's time, mass density radiation, the shape of the Universe, Critical density of the universe, density parameters, matter density parameter Ω_m , missing density and dark matter, dark density parameter $\Omega_{A,}$ understanding of accelerating universe through the observation of distant supernovae, how did astronomers first discover other galaxies, how did determine distance to galaxies, how do the spectra of galaxies tell that the universe is expanding, what happen when galaxies collide etc, study about the discovery of Quasars, ultra-luminous galactic nuclei, Seyfert and Radio galaxies, active galaxies, supermassive black hole as central engine, Unified model, Gamma ray bursters, the size and shape of the galaxy, spiral arms, Sun's orbit around the MW, density waves, etc			

PST 31210	Multimedia and Hypermedia Systems Development	T		
Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)				

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.				

PST-EBP-3101	Business English	T		
https://www.sab.ac.lk/app/eltu-curriculum				

For BSc Degree in Physical Sciences (Majoring in Chemical Technology)				
PST 31107	Introduction to Nanotechnology	T		
Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nature's Nanotechnology, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), Nanofabrication methods: Bottom-up and Top-down Approaches, Self-assembly, Introduction to Lithography				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical				

Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers, salt, milk products, cement, mineral sands, graphite, quartz etc. Research & Development and Service Laboratories,				

PST 31216	Biochemistry – I	T		
Review of cells, Introduction to Biochemistry, Carbohydrates Simple sugars disaccharides, Polysaccharides, Storage and structural polysaccharides, Structure and functions of lipids, Phospholipids, Sphingolipids, Cholesterol, Membrane structure and membrane fluidity, Transport across membranes, Protein structure and function,				

amino acids, Isoelectric points of amino acids and proteins, Primary secondary, tertiary and quaternary structures of proteins, Denaturation of proteins, Structure and function of haemoglobin, Sequencing of amino acids, Vitamins and Cofactors, Enzyme Catalysis, Activation Energy, Enzyme Kinetics

PST 31217	Electroanalytical Techniques	T		

Faraday's law of electrolysis, Strong and weak electrolytes and their conductivity, Kohlrausch's law of independent migration of ions, Determination of ionic concentrations, equilibrium constants and rate constants, Transference numbers, Conductometry and potentiometry, Nernst equation, Concept of e.m.f., Electro chemical cells and applications, Electroanalytical methods; Polarography, cyclic voltammetry, Amperometry, Electro-gravimetry, Coulometry, Electrophoresis, Electrochemical sources of energy, Fuel cells , Electroplating, Electrochemistry of corrosion.

PST 31218	Industrial Chemistry and Technology - II (Inorganic)	T		

Minerals of Sri Lanka: Silica, Quartz, Clay, Mineral Sands, Calcium Carbonate, Dolomite, Apatite, Gems, Graphite, Mica, Iron containing minerals and feldspar. Mineral based industries: Glass, Ceramic, Cement, Fertilizer etc. Mineral processing and extraction. Metallurgical techniques: Hydrometallurgy, Pyrometallurgy, Electrometallurgy. Metallurgy of Iron, Aluminium, Copper, Magnesium, Titanium and Sodium. Introduction to Alloys and their applications. Chemistry and value addition of gems.

PST 31219	Environmental Chemistry	T		

Air pollution: Structure of the atmosphere, Generation of air pollutants and sources, Classes of air pollutants and photochemical smog. Air quality standards, Air quality index (AQI) and air pollution monitoring. Indoor air pollution. Greenhouse effect and global warming. Kyoto protocol, Ozone layer depletion. Acid rain and its environmental consequences.

Water pollution: Pollutants in water and their origin. Water quality standards, analysis of water quality, Water treatment. Eutrophication and algal blooms. Industrial pollutants and industrial pollution control. Pollutants in soil, soil analysis, Health effects of water pollutants

Waste management: Types of wastes, Waste disposal practices (open dumping, sanitary landfills, Incineration, and biogas generation). Special types of wastes and their treatment: hospital, chemical, oil and radioactive wastes. 3R system of waste management, waste as a resource

PST 31120	Coordination Chemistry	T		

Co-ordination complexes, Structures, Stability constants, Chelate effect, Nomenclature, Co-ordination numbers, Coordination geometries, Reaction mechanism, Crystal field theory, Ligand field theory, Valence bond theory, d-orbital splitting in various geometries, Jahn-Teller effects, Consequences of d-orbital splitting (ionic radii, thermodynamic data), Spectra of co-ordination complexes

PST 31121	Laboratory Quality Control and Assurance	T		
Principles of QC (Matrix interference and spike analysis, Precision & accuracy, Blind samples, Sensitivity, Selectivity, Detection limits, Standard reference samples, Control charts, Instrument calibration, SOP, QC plan) Principles of QA (Method validation, Inter laboratory checks, Laboratory plans, QA plans, Data auditing and accreditation), Legal accreditation (ISO, SLS etc.)				

PST 31122	Physical Chemistry Laboratory II		P	
Organic electronic: Preparation of solid-state thin film, Fabrication and characterization of standard organic light emitting diode (OLED), Preparation and characterization of organic solar cells				

	PST 31123	Analytical Chemistry Laboratory II		P	
	Analytical Instrumentation, Spectroscopic analysis, Electroanalytical methods, Spectroscopic Identification of Organic molecules				

For BSc Degree in Physical Sciences (Majoring in Computer Science & Technology)				
PST 31210	Multimedia and Hypermedia Systems Development	T		
Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search,				

Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.				

PST 31215	Agile Software Development	T		
Agile and Lean Software Development, Basics and Fundamentals: Values, principles, stakeholders, Lean Approach, Agile and Scrum Principles, Agile Product Management, Agile Requirements, Agile Architecture, Agile Risk Management, Agile Review, Agile Testing, Scaling Agile for large projects.				

PST 31224	Artificial Intelligence & Expert Systems	T		
Artificial intelligence: Intelligent Agents, Search Techniques, Game Playing, Knowledge and Reasoning, First order logic, Logical reasoning systems, Uncertainty, Probabilistic Reasoning, Simple and complex Decisions, Learning. Expert systems: Characteristics and components of Expert systems, Machine learning, Knowledge base and bank, Rule Knowledge, Inference engine, transit fare rule, Rule interpreter, Inference tree				

PST 31225	Software Project Management	T		
Introduction to Software Project Management: Projects and Processes, The Process Framework, project integration Management, Scope Management, Time Management, project cost Management, Quality management, Human Resource Management, Communication Management, Risk Management, project management tools, advanced life cycle models, testing and maintenance and software project documentation and IT Management				

PST 31226	Software Quality Assurances	T		
Introduction to Quality Assurance, Quality Concepts, Software Quality Assurance Activities, Software Reviews and their importance Statistical SQA, Software Reliability, ISO 9000 approach to SQA, Software testing tools				

PST 31227	Object Oriented Analysis and Design	T		
High level overview of OO Development Process, Use Case/Responsibility Driven Design: Contract based approach, Responsibility identification, Responsibility allocation, Roles, stereotypes and interfaces, Collaborations; CRC cards Object-Oriented Principles: Why OO, Structured Engineering and Information Engineering, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Abstraction, Objects and Classes, Object Relationships, UML Diagramming, Design Patterns, testing objects.				

PST 31128	Computer Laboratory 3-I		P	
Python Basics – variables, identifiers, indentation, conditional, iterative, Data Structures -list , string, sets, tuples, dictionary, Overview of Data Analysis, Python for Data Analysis – NumPy, Pandas, Matplotlib Working with Python AI libraries - Tensorflow, Keras etc. , Develop models and simple applications using AI				

PST 31229	Advanced Database Management Systems	T	P	
Database Design and Implementation: Relational Database Design, Database Implementation & Tools, Advanced SQL, Database System Catalog, DBMS Advance Features: Query Processing & Evaluation, Transaction Management and Recovery, Database Security & Authorization, Distributed Databases: Enhanced Database Models, Object Oriented Databases, Database and XML, Introduction to Data Warehousing, Introduction to Data Mining, Emerging Trends and Example of DBMS Architecture: Emerging Database Models, Technologies and Applications, Big data.				

PST 31230	Social and Professional Issues in Computing	T		
History of computing, social context of computing, methods and tools of analysis, professional and ethical responsibility, risks and liability of computer-based systems, intellectual property, privacy and civil liberties, computer crime, customs and law, economical issues in computing, philosophical frameworks.				

Year III Semester II				
BSc Degree in Physical Sciences (Majoring in Applied Physics)				
PST 32801	Project Work: BSc Thesis in Physical Sciences (Majoring in Applied Physics)			**TH**
Industrial/ laboratory studies on a research problem relevant to Physical Sciences, Students will be required to conduct either research or survey related to physics, chemistry or computer science/ Information Technology either at a relevant industry,				

research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately

For BSc Degree in Physical Sciences (Majoring in Chemical Technology)				
PST 32802	Project Work: BSc Thesis Physical Sciences (Major in Chemical Technology)			**TH**
Industrial/ laboratory studies on a research problem relevant to Chemical Sciences, Students will be required to conduct either research or survey related to, chemistry either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

For BSc Degree in Physical Sciences (Majoring in Computer Science and Technology)				
PST 32803	Project Work: BSc Thesis in Physical Sciences (Majoring in Computer Science & Technology)			TH
Industrial/ laboratory studies on a research problem relevant to Physical Sciences, Students will be required to conduct either research or survey related to computer science at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

HONOURS DEGREE COURSE UNITS					
Year III Semester I					
BSc Honours in Applied Physics					
PST 31201	Solid State Physics	T			
Crystal Lattice & Translation Vectors, Symmetry Operations, Type of Lattices, Bravais lattice, Lattice Directions and Planes, Miller index, Inter-planar Spacing, Packing density, Simple crystal structures (close & loose packed), X-Ray diffraction, Bragg's law, The Von Laue treatment, X-Ray diffraction methods (Laue's, Rotary crystal & Powder methods), Atomic scattering factor, Geometrical structure factor & its applications to crystals, Lattice vibrations (Mono-atomic Lattice & Diatomic Lattice), Phonons, and Various theories of lattice specific heat (Classical theory, Einstein's theory)					

PST 31202	Nuclear Physics and Application	T		
General Survey of Radioactive Decay, Radioactivity, Rutherford Scattering, Discovery of the Neutron, Stable and unstable nuclei, Degree of Instability (Radioactive Half Life), Radioactive equilibrium; Binding Energies of Nuclei in their Ground States; Semi Empirical Mass Formula; Systematic of Beta Decay, Fermi Theory of Beta Decay; Theory of Alpha Decay; Theory of Gamma decay, Electron Capture, Auger Effect, Experiments on the Neutrino; Liquid Drop Model; Nuclear Potential Well, Introduction to Shell Model; Magic Numbers; Energy levels of the Shell theory potential; Nuclear Reactions; Conservation Laws; Nuclear Fission; Induced Fission; Chain reactions; Cross-section and differential cross-section; Nuclear Reactors; Nuclear Fusion; Sun; Hydrogen Burning; Applications of Radioactivity; Biological effects of Radiation; Introduction to Particle Physics, Standard Model and relativistic kinematics				

PST 31203	Quantum Mechanics	T		
Brief History of Quantum Physics, Photoelectric Effect, Compton Scattering, Photons, Franck-Hertz Experiment, the Bohr Atom, Electron Diffraction, De-broglie Waves and the Wave-particle Duality of Matter and Light, Heisenberg's Uncertainty Principle, Time Dependant Schrödinger equation (T.D.S.E.), Klein–Gordian equation, Time Independent Schrödinger equation (T.I.S.E), Normalization, Discrete Spectrum of Energy, Continuous Spectrum of Energy, Application of (T.I.S.E) to solve some Simple Problems in Quantum Mechanics for a Free Particle and a Particle in One-dimensional Potentials (Square, Barrier, etc.) and in Three–Dimensional Potentials, Probability Current Density, Some Applications of the Tunnel Effect in Physics, Hilbert Space, "Ket" and "Bra" Vectors, Matrix Formulation of Quantum Mechanics, Mean Values				

PST 31104	Material Physics	T		
Crystalline and Amorphous Solids, Space-Lattice and Primitive Cell, Bravais lattices, Crystal structures (BCC, FCC & HCP), Introduction to Miller indices, Point defects (Vacancy, Interstitial, Frenkel, Substitutional, Colour or F-Centres, Polarons), line imperfection (Edge Dislocation & Screw Dislocation), Burgers Vector and Burgers Circuit, Surface Defects (Grain Boundaries, Tilt Boundaries, Twin Boundaries & Stacking				

faults), Reciprocal Lattice concept and Ewald's sphere, Superconductivity, Sources of Superconductivity, Meissner Effect, Type I & Type II Superconductors, Super electrons, Cooper Pair, Normal Tunnelling and Josephson Effect, Isotope Effect & High-T_C Superconductivity

PST 31205	Special Relativity	T		

Introduction, Michelson-Morley Experiment; Einstein's Postulates, Lorentz Transformations, Time Dilation & Proper Time, Simultaneity, Length Contraction & Proper Length, 4–Vectors, Space–Time Interval, Space – time Diagrams, Minkowski Diagrams, Relativistic Velocity Transformations, Thomas Precession, Relativistic Doppler Effect, Relativistic Mass and Energy, Momentum and Energy Transformations, Decay of Elementary Particles

PST 31206	Optical Fiber & Telecommunication	T		

Classic communication methods and basic optics, structure of optical fibers, attenuation and pulse dispersion, parabolic-index-fibers and material dispersion, single mode fibers and parameters, fiber optic sensors, basics of fiber optic communication, types of fibers and dispersion in fiber optic communication, pulse code modulation and digital encoding, fiber optic sources and cable, fiber optic detectors

PST 31107	Introduction to Nanotechnology	T		

Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Importance of One Billionth of a Meter, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nanotechnology in Nature, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM Scanning Tunnelling Microscopy (STM), and Atomic Force Microscopy (AFM),), Nanofabrication methods: Bottom-up and Top-down Approaches, Self-assembly, Introduction to Lithography

PST 31108	Physics Laboratory 3-I		P	

AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino

PST 31209	The Origin and Evolution of the Universe	T		

The expanding Universe emerged from a cataclysmic event called the Big Bang. The universe before recombination, Olbers's paradox, observable universe, the Cosmic Microwave Background and the universe before recombination, Primordial fireball etc, Hubble's law, Hubble diagram, cosmological redshift, cosmological constant, the Plank's time, mass density radiation, the shape of the Universe, Critical density of the universe, density parameters, matter density parameter Ωm , missing density and dark matter,

dark density parameter ΩA, understanding of accelerating universe through the observation of distant supernovae, how did astronomers first discover other galaxies, how did determine distance to galaxies, how do the spectra of galaxies tell that the universe is expanding, what happen when galaxies collide etc, study about the discovery of Quasars, ultra-luminous galactic nuclei, Seyfert and Radio galaxies, active galaxies, supermassive black hole as central engine, Unified model, Gamma ray bursters, the size and shape of the galaxy, spiral arms, Sun's orbit around the MW, density waves, etc

PST 31210	Multimedia and Hypermedia Systems Development	T		

Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools

PST 31211	Mathematical Programming	T		

Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)

PST 31212	Numerical Methods	T		

Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution

of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.				

BSc Honours in Chemical Technology				
PST 31107	Introduction to Nanotechnology	T		
Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nature's Nanotechnology, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), Nanofabrication methods: Bottom-up and Top-down Approaches, Self-assembly, Introduction to Lithography				

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers, salt, milk products, cement, mineral sands, graphite, quartz etc. Research & Development and Service Laboratories,				

PST 31216	Biochemistry – I	T		
Introduction to Biochemistry, Review of cells: Organization of Eukaryotic cell structure and the functions of subcellular components, Importance of unique properties of water in biological systems. pH and buffers, Importance of buffering action in biological systems in maintaining structural and functional properties. The structure and function of Carbohydrates: Simple sugars, disaccharides, Polysaccharides, Storage and structural polysaccharides, Structure and functions of lipids: Phospholipids, Sphingolipids, Cholesterol, Membrane structure and membrane fluidity, Transport across membranes, Protein structure and function: amino acids, Isoelectric points of amino acids and proteins, Primary secondary, tertiary and quaternary structures of proteins, Denaturation of proteins, The structure and function of nucleic acid, Vitamins and coenzymes: structure and functions, Enzyme biochemistry: Enzyme Catalysis, kinetics of inhibition				

PST 31217	Electroanalytical Techniques	T		
Faraday's law of electrolysis, Strong and weak electrolytes and their conductivity, Kohlrausch's law of independent migration of ions, Determination of ionic concentrations, equilibrium constants and rate constants, Transference numbers, Conductometry and potentiometry, Nernst equation, Concept of e.m.f., Electro chemical cells and applications, Electroanalytical methods; Polarography, cyclic voltammetry, Amperometry, Electro-gravimetry, Coulometry, Electrophoresis, Electrochemical sources of energy, Fuel cells , Electroplating, Electrochemistry of corrosion.				

PST 31218	Industrial Chemistry and Technology - II (Inorganic)	T		
Minerals of Sri Lanka (Silica, Clay, Mineral Sands, Calcium Carbonate, Dolomite, Apatite, Gems, Graphite, Iron containing minerals), Mineral based industries (Glass, Ceramic, Cement, Fertilizer etc), Mineral processing and extraction, Metallurgical techniques such as hydrometallurgy, pyrometallurgy, electrometallurgy, metallurgy of Iron, Aluminium, Copper, Magnesium, and Sodium. Introduction to Alloys and their applications, Chemistry, and value addition of gems.				

PST 31219	Environmental Chemistry	T		
Air pollution: Structure of the atmosphere, Generation of air pollutants and sources, Classes of air pollutants and photochemical smog. Air quality standards, Air quality index (AQI) and air pollution monitoring. Indoor air pollution. Greenhouse effect and global warming. Kyoto protocol, Ozone layer depletion. Acid rain and its environmental consequences. Water pollution: Pollutants in water and their origin. Water quality standards, analysis of water quality, Water treatment. Eutrophication and algal blooms. Industrial pollutants and industrial pollution control. Pollutants in soil, soil analysis, Health effects of water pollutants Waste management: Types of wastes, Waste disposal practices (open dumping, sanitary landfills, Incineration, and biogas generation). Special types of wastes and their treatment: hospital, chemical, oil and radioactive wastes. 3R system of waste management, waste as a resource				

PST 31120	Coordination Chemistry	T		
Co-ordination complexes, Structures, Stability constants, Chelate effect, Nomenclature, Co-ordination numbers, Coordination geometries, Reaction mechanism, Crystal field theory, Ligand field theory, Valence bond theory, d-orbital splitting in various geometries, Jahn-Teller effects, Consequences of d-orbital splitting (ionic radii, thermodynamic data), Spectra of co-ordination complexes				

PST 31121	Laboratory Quality Control and Assurance	T		
Principles of QC (Matrix interference and spike analysis, Precision & accuracy, Blind samples, Sensitivity, Selectivity, Detection limits, Standard reference samples, Control charts, Instrument calibration, SOP, QC plan) Principles of QA (Method validation, Inter laboratory checks, Laboratory plans, QA plans, Data auditing and accreditation), Legal accreditation (ISO, SLS etc.)				

PST 31122	Physical Chemistry Laboratory II		P	
Organic electronic: Preparation of solid-state thin film, Fabrication and characterization of standard organic light emitting diode (OLED), Preparation and characterization of organic solar cells. Computer application in physical chemistry				

PST 31123	Analytical Chemistry Laboratory II		P	
Analytical Instrumentation, Spectroscopic analysis, Electroanalytical methods, Spectroscopic Identification of Organic molecules				

BSc of Science Honours in Computer Science and Technology				
PST 31210	Multimedia and Hypermedia Systems Development	T		

Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools

PST 31211	Mathematical Programming	T		

Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)

PST 31212	Numerical Methods	T		

Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)

PST 31014	Industrial Visits			F

Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.

PST 31215	Agile Software Development	T		
Agile and Lean Software Development, Basics and Fundamentals: Values, principles, stakeholders, Lean Approach, Agile and Scrum Principles, Agile Product Management, Agile Requirements, Agile Architecture, Agile Risk Management, Agile Review, Agile Testing, Scaling Agile for large projects.				

PST 31224	Artificial Intelligence & Expert Systems	T		
Artificial intelligence: Intelligent Agents, Search Techniques, Game Playing, Knowledge and Reasoning, First order logic, Logical reasoning systems, Uncertainty, Probabilistic Reasoning, Simple and complex Decisions, Learning. Expert systems: Characteristics and components of Expert systems, Machine learning, Knowledge base and bank, Rule Knowledge, Inference engine, transit fare rule, Rule interpreter, Inference tree				

PST 31225	Software Project Management	T		
Introduction to Software Project Management: Projects and Processes, The Process Framework, project integration Management, Scope Management, Time Management, project cost Management, Quality management, Human Resource Management, Communication Management, Risk Management, project management tools, advanced life cycle models, testing and maintenance and software project documentation and IT Management				

PST 31226	Software Quality Assurances	T		
Introduction to Quality Assurance, Quality Concepts, Software Quality Assurance Activities, Software Reviews and their importance Statistical SQA, Software Reliability, ISO 9000 approach to SQA, Software testing tools				

PST 31227	Object Oriented Analysis and Design	T		
High level overview of OO Development Process, Use Case/Responsibility Driven Design: Contract based approach, Responsibility identification, Responsibility allocation, Roles, stereotypes and interfaces, Collaborations; CRC cards Object-Oriented Principles: Why OO, Structured Engineering and Information Engineering, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Abstraction, Objects and Classes, Object Relationships, UML Diagramming, Design Patterns, testing objects.				

PST 31128	Computer Laboratory 3-I		P	
Python Basics – variables, identifiers, indentation, conditional, iterative, Data Structures -list , string, sets, tuples, dictionary, Overview of Data Analysis, Python for Data Analysis – NumPy, Pandas, Matplotlib Working with Python AI libraries - Tensorflow, Keras etc. , Develop models and simple applications using AI				

PST 31230	Social and Professional Issues in Computing	T		
History of computing, social context of computing, methods and tools of analysis, professional and ethical responsibility, risks and liability of computer-based systems, intellectual property, privacy and civil liberties, computer crime, customs and law, economical issues in computing, philosophical frameworks.				

Year III Semester II				
BSc Honours in Applied Physics				
PST 32201	Statistical Physics	T		
Introduction, Concept of Probability, Statistical Distribution, Mean Free Path & its Microscopic Calculation, Temperature and Thermal Equilibrium, Zeroth Law, Measuring Temperature, Kinetic Theory and the Ideal Gas, Equation of State, Ideal Gas Model, Work Done on an Ideal Gas (Constant Volume, Constant Pressure, Constant Temperature & Thermal Isolation), Internal Energy of an Ideal Gas, Heat Capacity & Specific Heat (at Constant Volume & Pressure), First Law of Thermodynamics & its Applications, Reversible & Irreversible Process, Heat Engine & Second Law, Refrigerator & Second Law, Carnot Cycle, Carnot Theorem and the Second Law, Absolute Zero Temperature, Entropy, Macroscopic and Microscopic States, Classical and Quantum Statistics, Maxwell−Boltzmann Statistics (Distribution of Speed, Distribution of Energies), Fermi−Dirac Statistics & Bose−Einstein Statistics				

PST 32102	Interaction of Radiation with Matter	T		
Introduction to interaction of radiation with matter, Photoelectric effect, Thomson Scattering, Compton effect, pair creation, photonuclear effect, attenuation, Interaction of electrons with matter, Interaction of heavy charged particles with matter, X-rays, Radiation protection basics, Introduction to particle detectors, Applications in interaction of radiation with matter				

PST 32203	Atmospheric Physics	T		
Introduction: Composition of the Atmosphere and its Vertical Structure Basics of Atmospheric Thermodynamics: The Gas Laws, Hydrostatic Equation and its Applications, The First Law of Thermodynamics, Work Heat, Adiabatic Processes, Second Law of Thermodynamics and its Applications in Atmospheric Science. Thermodynamics of Moist Air: Thermal Properties of Water Substance, Equation of State, Phase Change and Latent Heats, Vapour Pressure and Clausius–Clapeyron Equation, Adiabatic Process of Saturated Air, Thermodynamic Diagrams (e.g., Skew-T log-P diagram) Atmospheric Stability: Upper Air Soundings, Dry and Moist Adiabatic Lapse Rates and Static Stability Fundamentals of Radiation:				

Spectrum of Electromagnetic Radiation, Black–Body Radiation: Planck Function, Absorptivity and Emissivity. Wien's Displacement Law, Stefan-Boltzmann Law, Kirchhoff's Law, Physics of Scattering (Rayleigh and Mie) and Absorption and Emission, Atmospheric Phenomena (Rainbows, Blue and Red Skies etc.)
Applications of Radiation in the Earth-Atmosphere System:
Latitudinal and Seasonal Distribution of Solar Radiation, Radiative Heating and Cooling in Clouds, Atmospheric Absorption of Solar Radiation, Atmospheric Absorption and Emission of Infrared Radiation, Atmospheric Energy Balance and Greenhouse Effect
Properties of Cloud Particles:
Atmospheric Aerosols, Intermolecular Forces and Surface Tension, Equilibrium Vapour Pressure over Ice and Water Surfaces, Equilibrium Vapour Pressure over a Curved Surface, Condensation Nuclei and Equilibrium Vapour Pressure over a Solution, Formation and Growth of Cloud Droplets, classifications of basic types of clouds, Rain Formation, Ice Formation, Change Separation in Clouds and Lightning Discharges

PST 32104	Advanced Electronics	T		

Latches & Flip-Flops (S-R, J-K, D & Master), Shift Registers (Serial in-serial out, Serial in-parallel out, Parallel in-serial out & Parallel in-parallel out), Asynchronous & Synchronous Counters (MOD 8, MOD 16 & MOD 10), Alternative Representation of Logic Gates, Digital Arithmetic (Binary Addition, Subtraction using 2s Complement System & Multiplication with their Circutrary Diagrams), Decoders (BCD to Decimal, BCD to Seven Segment), Encoders, BCD Code & ASCII Code, Multiplexer, Analysis of Sequential Logic Circuits, Transition Tables, Sequential Circuit Design, Excitation Tables, Field Effect Transistors (FET), JFET & MOSFETS, FET Amplifiers, Data Busing, and Introduction to Memory Devices

PST 32205	Solid State Devices	T		

Physical Electronics & Devices, Electronic Properties of Materials, Solid State Electronic Devices, Optoelectronics, Microelectronic Technology and Applications of solid state devices in the Industry.

PST 32206	Astrophysics	T		

Classification Systems for Stars, Physical Parameters of Stars (Surface Intensities, Fluxes, Surface Flux and the Effective Temperature, Flux and the Anisotropy of the Radiation Field, Radiation Density), Principles and Theories of Star Formation, Stellar Interior Modelling, What powers the stars, What does hold a star up (Different Absorption Processes for Hydrogen, Boltzmann Formula, Saha Equation, H absorption coefficient in the Sun, Helium Absorption in the Sun, Metallic Absorption in the Sun, Scattering by Atoms and lons, Thomson Scattering by Free Electrons, Absorption Coefficients), Stellar interior and Atmosphere Modelling (Radiative Energy Transport through a Gas Volume with Absorption and Emission, Source Function, Absorption versus Emission Lines, Radiative Transfer Equation, Surface Intensities, Plane Parallel Atmosphere, Grey Atmosphere, Local Thermodynamic Equilibrium (LTE), , Effects of Radiation Pressure, Formation of Optically thin Lines, Line Absorption Coefficient, Doppler Profile, Voigt

Profile, Line Broadening due to Turbulent Motions, Other Distortions of the Line Profiles, Equivalent Widths for (Optically Thin Lines, Optically Thick Lines, Curve of Growth, Hydrogen Lines), Introduction of Hertzprung –Russell (HR) Diagram, Main Sequence Evolution of the Stars, Introduction of Variable, Binary Stars and their Properties, End Product of Star Evolution (White Dwarf/ Planetary Nebula, Neutrons Stars and Supernovae Type II, Concept of Black Holes)

PST 32207	Atomic and Molecular Spectroscopy	T		

Atomic Spectra

Energy Levels in Free Ions, Quantum Numbers, Pauli Exclusion Principle, Russel-Saunders Coupling, JJ-coupling, Multi Electron Atom and the Vector Model of the Atom, Hund's Rules for finding the Ground Term of a given Configuration, Lande Interval Rule, Selection Rules for Electric-dipole Transitions, Zeeman Splitting, Stark Splitting. Energy Levels of an Ion in a Crystal Field, Crystal-field Splitting d- and f- levels in a Cubic Crystal Feld

Molecular Spectra

Fundamentals–Rules and Principles, Separation of Molecular Energy – electronic, Vibrational and Rotational, Molecules in Rotation and Infrared Spectroscopy, Rotational Selection Rules, Experimental Methods and Centrifugal Distortion, Molecular Vibration and Infrared Spectroscopy, Vibrational Selection Rules, An-harmonic Oscillators, Frequency of Overtones, Vibrational-Rotational Fine Structure and Experimental Techniques, Raman Effect, Classical and Quantum Mechanical Description, Selection Rules, Depolarization Ratios, Experimental Methods. Vibration of Polyatomic Molecules, Introduction to Symmetry, Electronic Spectra, Frank-Condon Principle, Selection Rules

PST 32108	Current Topics in Physics (Solar Cells)	T		

Introduction, History, Thin Film Solar Cell Technology, Synthesis and Preparation of Semiconductor Films (Physical Vapour Deposition, Chemical Vapour Deposition, Molecular Beam Epitaxy, Sputtering, Chemical Deposition, Electrochemical Deposition, Spray Pyrolysis Deposition & Sol−gel method), Fundamentals of Photovoltaic Conversion, p−n Junction, Drift Current & Diffusion Current, Fill Factor, IPCE, Equivalent Circuit of a Solar Cell, Interfaces (Homo−Junction, Schottky−Junction & Hetero−Junction), Composite Semiconductor Nano−cluster and Quantum Well, Dye−sensitized Solar Cells (History, Theoretical Aspect, Dye−sensitized Solid-state & Electrochemical Photovoltaic Solar Cells, Hot Carrier Generation), Roughness Factor, Porosity, Finding the Band Gap and Band Edge Position, Transient Photocurrent, Fluorescence Spectrum, Dark I−V Measurements, Fourier Transform Infrared (FTIR) Spectroscopy, Scanning Electron Microscope (SEM), Transmission Electron Microscopy (TEM) and Scanning Probe Microscopy (SPM)

PST 32109	Human Resource Management	T		

Human resource management (HRM) and its environment, the importance of effective HRM, Strategic Human Resource Management (SHRM), HRM goals, HRM functions;

Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour manager relations, Termination of employment.

PST 32210	Statistics in Quality Control	T	P	
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Control Charts: Control charts for Attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), OC curve, and Process Capability Analysis. Acceptance Sampling Procedures: Single sampling plan for attributes, Double Sampling Plan for attributes, and Sequential Sampling by Variables. Quality Standards: ISO 9000 (QMS), ISO 14000 (EMS), 5S & KIZEN, TQM, Six Sigma and Lean, Introduction to Operations Research , Analysis the real world data by using statistical software and interpret the results, Group Research Assignment on Statistical Process Control				

PST 32111	Physics Laboratory 3 – II		P	
AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino				

PST 32212	Graph Theory	T		
Graphs and Digraphs (Graphs isomorphism, Subgraphs, Degrees, Indegrees, and outdegrees, Adjacency and Incidence matrices), Connectivity (Paths, Circuits and Cycles, Connected Graphs and Digraphs, trees and spanning trees, Eulerian and Hamiltonian Graphs), Optimization Involving Trees (Minimum weight spanning trees, Minimum weight branching, Matroids and the Greedy algorithm, Shortest path Problems, Flows and connectivity, Matching and Factors), Graph Embedding (Planer graph and duality, Hamiltonian plane graph), Colouring of Graphs (Vertex colouring, Edge colouring, colouring of planer graphs)				

PST 32213	Resource Efficient and Cleaner Production	T		F
Metrics of resource consumption (ecological footprint, water footprint (ISO 14046) and carbon footprint (ISO 14064)), Principles of Cleaner Production (CP), Introduction to CP auditing, Introduction to ergonomics, Introduction to Green Productivity (GP) Management system elements according to ISO 14001, Occupational health and safety management, ISO 45001, Quality management, ISO 9000 standards, Environment Performance measurements, Green reporting, Resource efficiency indicators, Benchmarking, Circular economy, Life cycle thinking, Biomimetics, Eco design, Environmental auditing and compliance, Environmental accounting, Chemical management				

BSc Honours Degree in Chemical Technology				
PST 32109	Human Resource Management	T		
Human resource management (HRM) and its environment, the importance of effective HRM, Strategic Human Resource Management (SHRM), HRM goals, HRM functions; Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour manager relations, Termination of employment				

PST 32210	Statistics in Quality Control	T		
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Control Charts: Control charts for Attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), OC curve, and Process Capability Analysis. Acceptance Sampling Procedures: Single sampling plan for attributes, Double Sampling Plan for attributes, and Sequential Sampling by Variables. Quality Standards: ISO 9000 (QMS), ISO 14000 (EMS), 5S & KIZEN, TQM, Six Sigma and Lean, Introduction to Operations Research, Analysis the real world data by using statistical software and interpret the results, Group Research Assignment on Statistical Process Control			

PST 32213	Cleaner Production & Green Productivity	T		
Metrics of resource consumption (ecological footprint, water footprint (ISO 14046) and carbon footprint (ISO 14064)), Principles of Cleaner Production (CP), Introduction to CP auditing, Introduction to ergonomics, Introduction to Green Productivity (GP) Management system elements according to ISO 14001, Occupational health and safety management, ISO 45001, Quality management, ISO 9000, Environment Performance measurements, Green reporting, Resource efficiency indicators, Benchmarking, Circular economy, Life cycle thinking, Biomimetics, Eco design, Environmental auditing and compliance, Environmental accounting, Chemical management			

PST 32214	Chemistry of Drug Design and Drug Action	T		
History of Medicinal Chemistry, Comparison of Traditional medicine and western Medicine, Chemical Modification of Drugs, Introduction to the pharmacokinetics process of a Drug (Absorption, Distribution metabolism and excretion (ADME) of a drug. Types of receptors, Enzymes as sites for drug action. Types of receptor-drug interaction. Dose–response curves, stereochemistry and drug action, Structural activity relationship (SAR) and drug design including, antipyretic, analgesics, NSAIDs, Opiate, antihistamines, anesthetics and antibiotics. Clinical Trials (stages, ethics, controls)			

PST 32215	Polymer Chemistry & Technology	T		
Introduction: Basic concepts, Properties and characterization of polymers , Types of polymers, Types of polymerization, Properties of polymers and specific uses, Synthetic polymers (Polystyrene and Styrene co-polymers, Dyes and related polymers, Acrylic				

polymers, Polyethers, Polyamides, Poly esters), Natural polymers (Rubber, Cellulose etc.), Processing of polymers, Polymer based industries, Polymer classification based on mechanical and thermal properties, Glass transition temperature (Tg) of a polymer, determination of Tg, Molecular weight of polymers, Number and Weight average molecular weight, Methods of molecular weight determination of polymers (Osmometry, light scattering, end group analysis, size exclusion chromatography), Molecular interactions in polymers, Solubility of polymers, Optical polymers, Mechanism of addition polymerization (Free radical, ionic, coordination), Polymer kinetics, Carother's equation for linear and non-linear step-growth polymerization, Polymer fabrication, Natural rubber products, Applications of polymers, Biodegradable polymers

PST 32216	Surface and Colloid Chemistry	T		
Introduction to surface phenomenon, Adsorption & absorption, Surface tension, Kelvin equations, and its application, Physisorption & Chemisorption, Sticking probability, Condensation coefficient, absorption theories, determination of surface area and molecular cross section (Langmuir methods, Gibbs adsorption isotherms) Colloidal systems, Electrophoresis & isolelectric points, Electrical double layer theory, Surfactants and their applications				

PST 32217	Biochemistry II	T		
Regulation of the central metabolic pathways: Glucose metabolism, Glycolysis, Gluconeogenesis, Pentose Phosphate Pathway, The Citric acid cycle, Metabolic regulation of glucose, Glycogen metabolism, Electron Transport chain and Oxidative phosphorylation, Photosynthesis (light reactions and Calvin cycle). Amino acid metabolism: Essential, non-essential amino acids, Biosynthesis of nonessential amino acids, Amino acid catabolism, Urea cycle, Genetic diseases/disorders associated with Amino acid metabolism, Lipid metabolism: Lipid transport, Biosynthesis of fatty acids, Metabolism of odd chain, even chain fatty acids				

PST 32118	Advanced Organic Chemistry	T		
Structure and reactivity: Hammond's postulate, Free energy diagrams. Linear free energy relationships. Kinetic isotope effect: Primary and secondary effects. Pericyclic reactions: Molecular orbital theory, Woodward-Hoffmann rules, Electrocyclic reactions, Correlation diagrams, Cycloadditions, Sigmatropic rearrangements, Stereochemistry.				

PST 32119	Introduction to Organic electronics	T		
The Fermi-Dirac distribution, Semi-conductors, Organic polymers, Conducting polymers and their applications, Solid state batteries, Nanostructures, Semiconductor catalysts, Photochemical solar cells, Photovoltaic solar cells.				

PST 32220	Structures and Properties of Solids	T	P	
Crystal Lattice: Seven crystal systems, Bravais Lattice, Reciprocal Lattice, Miller Indices, Interplanar spacing, Packing Density, Screening constants and effective nuclear charge. Ionic radii. Radius ratio and coordination number. Lattice energy formulae. X-ray Diffraction: X-ray generation, Single Crystal and Powder Diffraction techniques, Bragg's Law, Structure determination and refinement using XRD data and applications. Types of crystal structures: Rock salt, Zinc blende, CsCl, etc.				

PST 32121	Advanced Inorganic Chemistry Laboratory		P	
Experiments in inorganic chemistry, Thermodynamics and kinetics of transition metal ion complexes, X-ray diffraction, Crystal field theory, Non-aqueous solvent titrations, Ion exchange chromatography, Solid state synthesis, Synthesis of nitrogen doped carbon catalysts, Value addition of gems.				

PST 32122	Biochemistry Laboratory		P	
Writing a Biochemistry related research paper, Usage of micropipette, Buffer Preparation, Tests for carbohydrate, proteins and lipids, Titration curve to determine pKa, Separation of lipids from carbohydrates and identification of carbohydrates by TLC method, Calculation of glucose concentration in samples by UV/VIS Spectroscopic method, DNA Extraction, Polymerase Chain Reaction (PCR), Agarose gel electrophoresis, Analysis of Proteins, Subcellular fractionation and protein purification, Ammonium sulfate precipitation, SDS-PAGE Analysis.				

PST 32223	Organometallic Chemistry	T		
Organo transition metal chemistry; Eighteen electron rule, Classification of Ligands, Metal Ligand Binding (Carbon Monoxide, Dinitrogen, Olefins, Acetylenes, Nitric Oxide, Isocyanides, Carbenes, Carbynes) Reactivity, Patterns, Metal centered organometallic Reactions & (Oxidative Addition, Reductive Eliminations, Substitution reactions), Ligand modification Reactions (Insertion Reaction, Nucleophilic addition & abstraction, Electrophilic addition & abstraction), Homogeneous catalysis, Organometallic compounds as catalysts in industrial chemistry.				

BSc Honours Degree in Computer Science & Technology				
PST 32109	Human Resource Management	T		
Human resource management (HRM) and its environment, the importance of effective HRM, Strategic Human Resource Management (SHRM), HRM goals, HRM functions; Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour manager relations, Termination of employment.				

PST 32210	Statistics in Quality Control	T		
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Control Charts: Control charts for Attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), OC curve, and Process Capability Analysis. Acceptance Sampling Procedures: Single sampling plan for attributes, Double Sampling Plan for attributes, and Sequential Sampling by Variables. Quality Standards: ISO 9000 (QMS), ISO 14000 (EMS), 5S & KIZEN, TQM, Six Sigma and Lean, Introduction to Operations Research , Analysis the real world data by using statistical software and interpret the results, Group Research Assignment on Statistical Process Control				

PST 32212	Graph Theory	T		
Graphs and Digraphs (Graphs isomorphism, Subgraphs, Degrees, Indegrees, and outdegrees, Adjacency and Incidence matrices), Connectivity (Paths, Circuits and Cycles, Connected Graphs and Digraphs, trees and spanning trees, Eulerian and Hamiltonian Graphs), Optimization Involving Trees (Minimum weight spanning trees, Minimum weight branching, Matroids and the Greedy algorithm, Shortest path Problems, Flows and connectivity, Matching and Factors), Graph Embedding (Planer graph and duality, Hamiltonian plane graph), Colouring of Graphs (Vertex colouring, Edge colouring, colouring of planer graphs)				

PST 32224	Artificial Neural Networks	T	P	
Elementary neurophysiological principles, Artificial neuron models, Single layer networks (perceptions), Multi-layer feed forward networks (+back propagation), Cascade correlation (correlation training), Recurrent networks, Bi-directional associative memory, Counter propagation networks, Hopfield model, Adaptive resonance theory, Spatiotemporal sequences, SOFM, Individual projects				

PST 32225	Digital Image Processing	T		
Introduction to image processing, Elements of a digital image processing system; image acquisition, storage, processing, transmission and display, Image processing fundamentals; human vision system, sampling and quantization (spatial and brightness resolution), pixels and their relationships, Digital image processing techniques; image enhancement and restoration, pixel point processing, pixel group processing, frequency domain processing(Fourier transform), image analysis, coding systems; error detection and correction, data compression schemes.				

PST 32226	Data Mining and Applications	T		
Introduction: Data Mining, Machine learning, Patterns, Example data sets, applications, Input, Output, Basic Learning Algorithms: Inference Rudimentary rules (1R), Statistical Modeling, Divide and Conquer, Covering algorithms, Association rule mining, Instance-Based Learning, Clustering, Evaluating Learning Algorithms: Cross-Validation, Comparing data Mining schemes, predicting probabilities, counting cost, ROC Curves, Evaluating Numeric Prediction, Data mining tools, Individual Project.				

PST 32227	Data Communication and Computer Networks	T		
Introduction to Data Communication, The Physical Layer, Framing, Error Detection and Correction, Channel Allocation, Routing and Congestion Control Algorithms, Internet Working, Transport Protocols, Network Security and Administration, Applications (SMTP, HTTP, NNTP).				

PST 32228	Computer Graphics and Visualization	T		
Basics of Computer Graphics: Introduction, Graphics Pipeline and Coordinate Systems, Transformations in 2D, Three Dimensional Graphics, 3D Viewing, Scan Converting Lines, Circles and Ellipses, Lines And Polygons, Solid Modelling, Visible Surface Detection, Illumination and Shading, Curve Representation, Anti-Aliasing ,Colour, Soft Objects, Rendering: Lighting Models, Fast-Phong Algorithm, A-buffer, V-buffer, Ray-tracing Algorithms, Geometric Transformations Animation: Key-frame Systems, Animation Languages, Kinetic vs. Dynamic Systems, Modelling Human and Animal Motion				

PST 32229	Project in Computer Science and Technology (Mini Project)	P		
Independent practical will be conducted on one or more on the given topics				

PST 32130	Computer Laboratory 3-II		P	
Implement Graphics and Digital image processing techniques using MATLAB, Working with Data mining tool.				

PST 32231	Human Computer Interactions	T		
Foundation of HCI, Usability principles, building a simple GUI, Human abilities, human-centered software development, cultural aspects, human-centered software evaluation, GUI design, GUI programming, HCI aspects of multimedia systems, HCI aspects of collaboration and communication, validation of usability and user experience, Handling errors & help				

PST 32232	Bioinformatics	T		
Introduction to bioinformatics, Bioinformatics algorithms Basic concepts in Molecular Biology, Nucleic acids and Proteins, Bioinformatics Databases, Sequence alignment, Similarity searching, DNA sequence analysis and protein Sequence analysis, protein structure prediction, Genome bioinformatics, Applications of bioinformatics. Computational approaches to biological science concepts of bioinformatics the computational skills for problems solving in biology, Establish, and maintain research information in biology, Solutions to bioinformatics, software packages, usages, and development				
PST 32133	Current Topics in Computer Technology	T		
Current trends and demands in the field of Computer Science and technology. Topics				

like policies and laws in software industry, Software quality assurance, Design Patterns, Blockchain Technologies

Year IV Semester I				
BSc Honours Degree in Applied Physics				
PST 41201	Research Methodology and Scientific Communication	T		
Some reflections on the theory of evolution of knowledge, Inductive and deductive methods in research, Research design: identifying issues and problems, defining research problem(s) and objectives, identifying data requirements, sources, and instruments for data gathering, Introduction to design science.				

PST 41202	Computational Physics	T	P	
Introduction to Mathematica, Execute commands in Syntax method, Palette's and Plain English format Mathematics & Algorithms: Develop mathematical functions, Vector analysis, Probability and statics, Differentiate, Integration, Solve linear equations, first order, second order and third order differential equations, Interpolation and extrapolation, linear and non-linear situations and modeling of practical scenarios Visualization & Graphics: Visualization of 2D, 3D functions, Develop histogram, Bar charts, pie charts for financial data, Styling the functions, Import and export of image, word, excel document to interface and vice versa, Manipulation of Physical scenarios, mathematical modeling, Object animation, Develop sound and wave's for practical situations				

PST 41203	Robotics	T	P	
General Introduction, Analog and Digital Circuits for Control Applications, Electronic Devices used in Robotics, Microprocessor/ Microcontroller & Interfacing, DC and Stepper Motors, Design of Mechatronics Systems, Sensors and Signal Processing, Power Electronics, Two wheel Driven Autonomous Robot Applications				

PST 41204	Remote Sensing & GIS	T		
Remote Sensing : Basic Principles of Remote Sensing ;(Introduction to Remote Sensing Key Words: Platforms, Satellite Orbits, Sensor, Electromagnetic Spectrum, Introduction to a Digital Image and Active and Passive Satellites Systems), Earth Observation Satellites and Sensors; (Introduction to Different Satellite Systems, Sensor Characteristics and Image Resolution), Distortions and Corrections; (Radiometric / Geometric Distortions and Corrections, Image Enhancement Techniques, Basic Digital Image Processing; (Image Interpretation, Classification and Image Fusion), Microwave Remote Sensing; (Basic Theory and Applications), Applications of Remote Sensing. **Geographic information systems (GIS):** Introduction to GIS, Cartographic Data Structures such as Vector Raster and Attribute Data, Digitizing, Editing and Geo-				

referencing, Development and Use of a GIS, Basic Concepts of Spatial Modelling and Analysis, Data Visualization and Presentation for GIS.

PST 41205	Geophysics	T		
Introduction to Geophysics; Principles and Processes; Methods of Investigation, Materials of the Earth, Seismic Methods, Gravity and Magnetic Methods, Electrical and Electromagnetic Methods, Borehole Geophysics, Introduction to Global Geophysics, Principles of Geophysical Exploration				

PST 41206	Medical and Bio Physics	T		
Physics of the Body (Body Structure) Analyzing Forces in the Body, Forces on (Hip Joint & Backbone), Body Movements (Standing, Walking), Eye (Optical System), Defects in the Eye's Optical System, Ear (Threshold of hearing, loudness, Hearing Defects), Body Electric (Nerve Cells, Heart, Measuring Electrical Signals of the Heart, ECG.) Introduction to Medical Physics, Production of Radioactive Materials in Medicine and their Properties and Applications, Various Attenuation Coefficients, Interaction Processes and their Practical Consequences, X - ray Tube and Generators, X – ray Production and Properties , Imaging with X ray an Film Processing, X ray Imaging Modalities (General Radiography, Mammography Fluoroscopy and Computed Tomography), Image Quality Influence Factors, Introduction to Nuclear Imaging (Gamma Camera), Basics of Radiotherapy (Teletherapy Machines, Simple Treatment Planning, Dosimetry Principles and Detectors), Basics of Radiobiology and Radiation Protection Light in Medicine (Visible Light, IR, UV and Laser), Interaction of Light with Biological Systems, Trans-illumination and Endoscopy, Principles of Laser Production, Types of Commercially Available Laser and their Features, Biological Effects Caused by Lasers, Laser Instrumentation, Clinical Application of Lasers and Laser Hazards, Properties of Ultrasound (US), Generation and Reception of US, Imaging with US and Scanning Methods, Types of US Scanners and their Features, Artifacts of US Imaging, Typical Applications of US in Diagnostic Radiology and Biological Effects, Nuclear Magnetic Resonance Imaging(MRI), Principles of Nuclear Magnetic Resonance, MRI Instrumentation, MRI Safety, Medical Applications of MRI			

PST 41207	Advanced Nanotechnology	T		
Nanomaterials and/ or Nanopowders, Bonding Atoms to make Solids and Molecules (Ionic, Metallic and Covalent Bonding in Materials), Forces at Nanoscale, van der Wall Force versus Gravity, Crystal Structures (14 Bravis lattices), Structure Small enough to be different and useful, (Particles, Colloidal Particles, Wires, Films, Layer and Coating, Porous Materials etc), Widely used Method for Nanoparticle Preparation, Nucleation, Growth and Termination of Growth of Nanoparticles, Types of Interactions between Nanomaterials, Stabilization of Nanomaterials in Sols, Quantum Dots of Many Colours and Metal Nanoparticles, the Carbon Age, Carbon Nanotubes and Fullerenes-Synthesis, Properties, Characterization, and Applications of, Graphene as a Mother of all Carbon Allotropes-Synthesis, Properties, Characterization and Applications of, Vein				

graphite as a source to produce nanocarbon materials (CNT, GO, rGO and graphene), Introduction to Electronic and Chemical Characterization of nanostructured materials using Surface Science and other (Raman, XRD, FTIR, TGA, Particle size Analyzer) Techniques: Basic Physical Concepts and Operationof X-ray Photoelectron Spectroscopy(XPS), Ultraviolet Photoelectron Spectroscopy (UPS), Auger Electron Spectroscopy (AES). Brief Introduction to Synchrotron Radiation and Techniques based on it, Physics based Experimental Approaches to Nanofabrication and Nanotechnology, Bottom-up and Top-down Approaches of Nanofabrication, Molecular Self-assembly, Lithography, Applications of Nanotechnology in: (here or somewhere it is needed to introduce course contents on organic electronics, bioelectronics, and nano-electronics as was mentioned in the course description), Energy, Agriculture, Water Treatment, Disease Diagnosis, Drug Delivery, Food Processing and Storage, Air pollution Monitoring, Construction Industry, Health Monitoring, Vector and Pest Control

PST 41208	Data Acquisition and Signal Processing Methods	T		

Elements of a Computer Controlled Data Acquisition System, Various Types of Sensors and Detectors, Signal Processing; Noise, Pile-up Effects, Signal to Noise Ratio, Improving Signal to Noise Ratio; CR-RC Pulse Shaping, Linear Wave Shaping, Passive Filters, Active Filters, Delay Lines, Non-linear Wave Shaping, Signal Processing Electronics; Discriminators, Comparators, Schmitt Trigger, Timing Circuits, Leading Edge Trigger, Zero Crossing Trigger, Constant Fraction Trigger, Signal Conversion Methods; Converters and Analyzers, Encoders, Decoders and Multiplexers, Coincidence Units, Coincidence Techniques used in Nuclear Physics Experiments, Basic Computer System Organization; Memory Devices; Semiconductor ROMs and RAMs, ROM Applications, Static and Dynamic RAMs and their Operations, Microprocessor Architecture; Machine Language Representation, Assembly Language Programming, Microprocessor Applications in the Laboratory, Computer Controlled Electronics; CAMAC Standard, FASTBUS, GPIB Interfaces, examples of Data Acquisition Systems

PST 41209	Advanced Laser Physics	T		

Normal Laser Oscillation, Theory of Q-switching, Types of Q-switch
Effects Leading to Multi-mode Oscillation, Homogeneous & Inhomogeneous Broadening, Spectral & Spatial Hole Burning, Doppler Broadening, Lamb Dip, Mode Pulling.
Mode Selection, Isolation of a Single Laser Transition, Selection of Longitudinal Modes, Selection of Transverse Modes, Effects of Mode Selection on the Laser Output
Mode Locking, Longitudinal Mode Locking, Other Types of Mode Locking, Active &Passive Mode Locking Techniques, Isolation of a Single Mode Locked Pulse, Amplification and Detection of Mode Locked Pulses.
Rate Equation Model for 3-level and 4-level Lasers, Introduction to Laser Media-Solid, Liquid and Gaseous Media, Resonator Design, Reflector Types and Laser Rod Design
Three- and Four-level Laser Systems, Parameters Affecting Laser Threshold, Advantages of Four-level Systems, Optical Pumping and Power Threshold, Energy

Threshold for a Pulsed Laser, Energy Threshold for a Pulsed Laser, Power Threshold for CW Lasers, Energy output for Pulsed Lasers and Power Output for CW Lasers, Optimum Output Coupling Factor.
Gas Lasers – Methods of Excitation, Electron Collision Kinetics, Impurity Gas Kinetics, Different Types of Gas Lasers, Semiconductor Lasers & Dye Lasers
Non-Linear Optics

PST 41210	Automation	T	P	

Intelligent Controllers, Programmable Logic Control, Automation Elements, Hardware Components for Automation and Process Control, Logical Design for Automation, Electro Pneumatic Automation
Industrial Networks (RS232, RS485/422, SPI, I2C, CAN, MODBUS, PROFIBUS), Basic Programming in PLC and the PID at the Industry SCADA Systems and Software

PST 41211	Astronomical Instruments and Data Reduction & Analysis Techniques	T	P	

Introduction to celestial coordinate systems, right ascension, declination, altitude and azimuth sidereal time sidereal day and solar day, hour angle, celestial equator, Basic optics, optical telescopes refracting telescopes, refractor telescopes, catadioptric telescopes, classical Cassegrain and smidth Cassegrain telescopes, equatorial mount and alta-azimuth mount, angular resolution, spectrographs, gratings, photomultiplier tubes, internal electronics of CCD camera and its mechanism, celebration of an astronomical image using dark, bias and flat field CCD frames, what are the variable stars, why they change the brightness, types of variable stars and their current research
Observational Project
Prepare a telescope with an aperture more than 30 cm (12 inch) and a CCD camera to observe lower magnitude short period variable stars. Using astronomical software and variable star catalogues find out appropriate variable stars to observe. Learn how to capture dark, bias, flat and object frames and prepare the object frame for the analysis. Using Image Reduction and Analysis Facility (IRAF) software (your instructor will teach of usage of IRAF) reduce the object frame into the magnitudes. Using various codes draw the light variation diagrams, the light curve, to identify the light variation of the object star.

PST 41212	Electrochemical Power Conversion	T		

Principles of electrochemical energy conversion: Thermodynamics, Kinetics, Transport phenomena. Electrochemical techniques and their applications: Electrochemical impedance spectroscopy, Cyclic voltammetry, Galvanostatic intermittent titration. Electrochemistry of batteries. Lithium-ion battery: Nanostructured materials for lithium-ion batteries. Metal-oxygen battery: Aqueous and non-aqueous metal-oxygen batteries, Supercapacitors: Principle of operation and advanced supercapacitor technologies. Fuel cell design and principles: Proton exchange membrane fuel cells, alkaline anion exchange membrane fuel cells, Solid oxide fuel cells, Advanced electrocatalysts and membranes for fuel cells. Redox flow batteries.

PST 41013	Literature Search Seminar in Physics	T		
A topic would be provided where the student is required to conduct a literature survey and present the obtained data at a seminar series				

PST 41014	Independent Research / Project in Physics		P	
Independent practical will be conducted on one or more on the given topics				

PST 41215	Industrial Management	T		
Business Organization & the economical effective planning, Production Management, Production process planning & control, Industrial Engineering: plant management Inventory & warehouse management, marketing management				

PST 41216	Classical Mechanics	T		
Mechanics of a particle and system of particles, constraints and D'Alembert's principle, Lagrange's Equations, Hamilton's principle, conservation laws and symmetry, two-body problem, orbits, virial theorem, scattering in central force field, three-body problem, rigid body motion, Hamilton equations of motion, principle of least action, canonical transformations, Poisson brackets, canonical perturbation, introduction to general theory of relativity				

PST 41235	Critical Thinking	T		
Introduction to Critical Thinking, Practical uses of Critical Thinking for personal development, Way of inspiring Critical Thinking in individual and Groups. Defining problems and making critical decisions, Critical Thinking for personal goal setting				

BSc Honours Degree in Chemical Technology				
PST 41201	Research Methodology and Scientific Communication	T		
Some reflections on the theory of evolution of knowledge, Inductive and deductive methods in research, Research design: identifying issues and problems, defining research problem(s) and objectives, identifying data requirements, sources, and instruments for data gathering, Data analysis and Interpretation, Writing and Presentation of research results, Research management.				

PST 41207	Advanced Nanotechnology	T		
Introduction to Nanoscale Physics, Quantum Nature of Nanoworld, Revisit the Fundamental Concepts of Quantum Mechanics, Atomic Orbital, Electromagnetic Waves and their Production, the Quantization of Energy, Atomic Spectra and Discreteness, the Photoelectric Effect, Wave-particle Duality of Matter, the Double Slit Experiment, the Uncertainty Principle, Particle in a Well and Esaki Quantum Tunnelling Diodes. Nanomaterials and/ or Nanopowders, Bonding Atoms to make Solids and Molecules (Ionic, Metallic and Covalent Bonding in Materials), Forces at				

Nanoscale, van der Walls Force versus Gravity, Crystal Structures (14 Bravais lattices), Structure Small enough to be different and useful, (Particles, Colloidal Particles, Wires, Films, Layer and Coating, Porous Materials etc), Widely used Method for Nanoparticle Preparation, Nucleation, Growth and Termination of Growth of Nanoparticles, Types of Interactions between Nanomaterials, Stabilization of Nanomaterials in Sols, Quantum Dots of Many Colours and Metal Nanoparticles, the Carbon Age, Carbon Nanotubes and Fullerenes-synthesis, Properties, Characterization, and Applications, Graphene as a Mother of all Carbon Allotropes synthesis, Properties, Characterization and Applications, Introduction to Nanostructure Electronic and Chemical Characterization using Surface Science Techniques: Basic Physical Concepts and Operation (these topics are first time in the university system in SL) of X-ray Photoelectron Spectroscopy, Ultraviolet Photoelectron Spectroscopy, (May be include scanning tunneling spectroscopy) Auger Electron Spectroscopy and Brief Introduction to Synchrotron Radiation and Techniques based on it, Physics based Experimental Approaches to Nanofabrication and Nanotechnology, Bottom-up anTop-down Approaches of Nanofabrication, Molecular Self-assembly, Lithography, Applications of Nanotechnology in: Energy, Agriculture, Water Treatment, Disease Diagnosis, Drug Delivery, Food Processing and Storage, Air pollution Monitoring, Construction Industry, Health Monitoring, Vector and Pest Control

PST 41212	Electrochemical power conversion	T		
Thermodynamics of Electrochemical Reactions, Kinetics of Electrochemical Reactions, Electrochemical Techniques (Electrochemical Impedance Spectroscopy (EIS) and its Applications, Cyclic voltammetry and Linear Polarization, Galvanostatic Intermittent Titration); Principles of Batteries, Advanced Rechargeable Battery, Li-ion Battery, Nanostructured Materials for Li-ion Battery, Principle of Super Capacitors, Advanced Super Capacitor Technology, Difference between Batteries and Super Capacitors, Principle of Fuel Cells, Types of Fuel Cells, New Material for Proton Exchange Membrane Fuel Cells, Alkaline Fuel Cells and Solid Oxide Fuel Cells, Applications of Fuel Cells, Fuel Cells, Battery and Super Capacitor Hybrid Power System				

PST 41215	Industrial Management	T		
Business Organization & the economical effective planning, Production Management, Production process planning & control, Industrial Engineering: plant management Inventory & warehouse management, marketing managements				

PST 41217	Natural Products Chemistry	T		
Primary and secondary metabolism, Enzymes and coenzymes, Construction mechanisms in biological systems such as alkylation, Wagner-Meerwein rearrangement, Aldol and Claisen condensations, Schiff base formation, Mannich reaction, Transamination, reductions and oxidations in biosynthesis. Fatty acids and polyketides from acetate pathway: Saturated/Unsaturated fatty acids, Prostaglandins, Aromatic polyketides (Cyclization to give simple phenols and Anthraquinones), alkylation and coupling reactions of polyketides, Macrolides and polyether,				

Cyclization through Diels-Alder reaction to give statins. Aromatic amino acids and phenylpropanoids from shikimate pathway: Aromatic amino acids and simple benzoic acids, Lignans and lignin, Phenylpropanes, Benzoic acids from C6C3 compounds, Coumarins. Terpenoids and steroids from mevalonate pathway: Monoterpenes, Sesquiterpenoids, Diterpenoids, Sesterterpenoids, Triterpenoids, Carotenoids, Steroids. Steroid skeleton, numbering, conformations, main types of steroids and their biological functions, important reactions and synthesis/partial synthesis of steroids. Biosynthesis of Alkaloids from amino acids: Chemical structure, Biosynthesis of alkaloids derived from ornithine, lysine, nicotinic acid, tyrosine, tryptophan, anthranilic acid, and histidine, important reactions of alkaloids. Mixed biogenesis: Flavonoids and stilbenes, Meroterpenoid, Carbohydrates: Conformations of carbohydrates and conformational effects. Reactions of carbohydrates. Synthesis of modified carbohydrate molecules and other natural products

PST 41218	Biotechnology	T		
Introduction to biotechnology and multidisciplinary in biotechnology (What is Biotechnology, Brief history and different areas of biotechnology, "traditional" vs "modern" biotechnology). The impact of biotechnology on society. DNA structure and function. DNA as genetic material. DNA replication to protein synthesis. DNA sequencing. Recombinant DNA technology. Techniques in analyzing DNA (PCR, southern blotting). Human Genome Project, DNA typing (paternity testing, criminal investigation, disease identification). Genetic engineering and gene therapy. Vaccine production, Genetic engineering for improving quality and productivity in agriculture, fuel production etc. Introduction to bioinformatics.				

PST 41219	Advanced Solid State Chemistry	T		
Solid state materials. Solid solutions: Substitutional and interstitial solid solutions, Alloys. Crystal defects, Solid state Diffusion. Solid state synthesis: Ceramic method, Co-precipitation, Sol-gel method, Microwave synthesis, Hydrothermal synthesis. Characterization of solid-state products: Microscopy, Spectroscopy, Thermal analysis. Metallic bonding and band theory of solids: Band structure of metals, Insulators and semiconductors, The Fermi-Dirac distribution.				

PST 41120	Bioinorganic Chemistry	T		
Introduction, Composition, and structure of metals in biological systems, Role of metals in biological systems, Metals in human health, Specification and speciation of metal complexes, Hard and soft acid and base theory, Classification of metals in biological systems, Transition metals in biological redox reactions. Oxygen transport and nitrogen fixation. Inorganic model systems. Inorganic model systems to mimic active sites in enzymes. Vitamin B12. Transport and storage of iron. Biological role of metals: zinc and copper				

PST 41221	Instrumental Analysis	T	P	

Atomic spectroscopic methods: Atomic Absorption Spectroscopy (AAS), Inductively Coupled Plasma spectroscopy (ICP). Direct current plasma spectroscopy (DCP); X-ray fluorescence spectroscopy (XRF)
Surface analytical methods: Ultraviolet photoelectron spectroscopy, X-ray photoelectron spectroscopy, Rutherford back scattering (RBS)
Chromatographic methods: Gas chromatography (GC); High performance liquid chromatography (HPLC), Ion chromatography (IC), Supercritical fluid chromatography (SFC); Affinity chromatography; Size exclusion chromatography; Hyphenated techniques: GC-MS, LC-MS, EPMA, FTIR-GC, Recent advances and applications of the above techniques)

PST 41222	Applied Molecular Modelling	T		
Chemical structure and property calculations and drawing, molecular mechanics methods (Force fields, Inter intra molecular forces), Stable conformers calculations & energy minimization algorithms , Molecular dynamics (Classical treatment of system of particles, Montecarlo methods, Prediction of thermodynamic Properties, QSAR prediction method), Ab-inito methods (HF theory, Molecular orbitals and HOMO LUMO), Vibrational and rotational spectroscopic calculations, Efficient use of public domain soft ware				

PST 41223	States of Matter	T		
Review of the gas laws and the kinetic theory of gases. Statistical thermodynamics. Intermolecular forces and potential energy surfaces. Properties and theories of liquids. Ionic liquids and their applications. Liquid crystals and their applications. Properties and theories of solids: Heat capacities, Einstein and Debye models, Free electron theory of a metal. Introduction to crystal engineering.				

PST 41124	Literature Search in Chemistry	T		
A topic would be provided where the student is required to conduct a literature survey and present the obtained data at a seminar series				

PST 41225	Independent Research / Project in Chemical Technology		P	
Independent practical will be conducted on one or more on the given topics Research methodology; Hypothesis, Theory and scientific laws & models, Peer, nonpeer literature surveying methods and data bases, Critical analysis of literature for problem identification, Research methodology designing methods, Research planning & time management, Laboratory book & record keeping, Results analysis, Research proposal & report format, Research manuscripts				

PST 41226	Computer Applications in Instrumentation	T		
Logic gates, Computer memory organization, Digital conversation, Data acquisition and instrument interfacing, graphical programming exercises, Plotting of radical				

functions, Computational chemistry; Ab initio methods, Density functional theory methods (DFT), Semi-empirical methods, Molecular mechanics, Methods for solids, Chemical dynamics, Molecular dynamics, Quantum mechanics/Molecular mechanics (QM/MM)

PST 41235	Critical Thinking	T		
Critical Thinking Scientific Approaches, Decision Making, Creative Process, Leaning process, Breaking Problems down, Problem Analysis, Role Play, Logic				

BSc Honours Degree in Computer Science & Technology				
PST 41201	Research Methodology and Scientific Communication	T		
Some reflections on the theory of evolution of knowledge, Inductive and deductive methods in research, Research design: identifying issues and problems, defining research problem(s) and objectives, identifying data requirements, sources, and instruments for data gathering, Introduction to design science				

PST 41203	Robotics	T	P	
General Introduction, Analog and Digital Circuits for Control Applications, Electronic Devices used in Robotics, Microprocessor/ Microcontroller & Interfacing, DC and Stepper Motors, Design of Mechatronics Systems, Sensors and Signal Processing, Power Electronics, Two wheel Driven Autonomous Robot Applications				

PST 41215	Industrial Management	T		
Business Organization & the economical effective planning, Production Management, Production process planning & control, Industrial Engineering: plant management Inventory & warehouse management, marketing management				

PST 41227	Web services	T	P	
Communication Protocols: RESTFul services, SOAP services (WS-* protocols), Serialization Formats: XML (XML Schema, XPath and XSLT), JSON, Text Encoding Formats, Binary Formats (Protobuf), Security: OAuth, JWT, SWT, Distributed Web applications development using a Java Web Framework.				

PST 41228	Computer System Security	T		
Introduction to security, Features of security systems, Threats and attacks on security, Introduction to cryptography, Cryptographic systems, Digital Signatures, Secure Protocols, Kerberos, VPN, L2TP, PPTP IP Sec, SSL, HTTPS, firewalls				

PST 41229	Advanced Computer Networks	T		
Layered communication architecture: layers, services, protocols, layer entities, service access points, protocol functions, IPv6, Advanced Routing algorithms, Advanced Network Congestion Control algorithms, Quality of service, Real Time Transport				

Protocol, Internetworking, Performance Issues, Overview on VPN networks, Overview on Wireless Networks and Mobile Networks: LAN, PAN, Sensor Networks, Ad-hoc Networks, Mobile IP, Mobile TCP, IP Security, Network Programming Development

PST 41230	Internet of Things (IoT)	T	P	
Introduction to IoT: Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs. IoT & M2M: Machine to Machine, Difference between IoT and M2M, Software define Network. Network & Communication aspects, Challenges in IoT Design challenges, Development challenges, Security challenges, other challenges. Components of an IoT Solution, Competing Standards for IoT, Domain specific applications of IoT: Home automation, Industry applications, Surveillance applications, Other IoT applications. Developing IoTs: Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor based, application through embedded system platform, Implementing IoT, concepts with python				

PST 41231	Natural Language Processing	T		
Introduction: Brief history of NLP research, some current applications, components of NLP systems. Linguistic Phenomena: Morphology, Parts of Speech, Syntax, Model-Theoretic Semantics, Lexical Semantics, Pragmatics. Formal Representations: Finite State Automata, Context-Free Grammars, First Order Logic, Frame Semantics, Other Structures. Formal Methods: Hidden Markov Models, Sequence Classification, Syntactic Parsing, Forward Algorithm, Viterbi Algorithm, Rule-Based Systems, Statistical Classifiers. Prediction and part-of-speech tagging: Corpora, simple N-grams, word prediction, stochastic tagging, evaluating system performance. Interpretation: compositional semantics and entailment, pragmatic inference. Recent NLP research, Practical on sentiment analysis.				

PST 41232	Cloud Computing	T		
Cloud Computing Concepts: Introduction to cloud computing, Properties, characteristics & disadvantages, Gossip, Membership & Grids, P2P Systems, Key-Value Stores, Time & Ordering Classical Distributed Algorithms. Cloud Systems & Infrastructure: Cloud computing stack, Service model, Deployment models, Containers, virtual machines, MAAS, PAAS, Web Services. Storage: Ceph, SWIFT, HDFS, NAAS, SAN, Zookeeper. Big Data & Applications in the Cloud: Spark, Hortonworks, HDFS, CAP, Streaming Systems, Graph Processing & Machine Learning. Cloud Resource management & Service management in cloud computing. Cloud Networking: Introduction to cloud networking SDN with cloud, Data center networking. Cloud security: Identity & Access management, Access control, Authentication in cloud computing. Developing application in cloud platform, Introduction to Cloud Computing with AWS, Azure google's cloud platform. Research trends in cloud: Edge & Fog computing, cloud & IoT. Hands on experience using a cloud-based tool.				

PST 41233	Business Process Management Systems	T		
Simulation in management decision making, Queuing theory, Concepts of discrete-event simulation, Construction of models: modeling issues, verification and validation of models, development of simulation models using selected software, analysis of results				
PST 41234	Mobile Computing	T	P	
Introduction to Mobile Computing, Applications, Characteristics, Mobile computing architecture, Mobile networks: GSM, Mobile IP, Bluetooth, WiMAX, IPV6, Smart cards, Mobile Applications development				

PST 41135	Critical Thinking	T		
Introduction to Critical Thinking, Practical uses of Critical Thinking for personal development, Way of inspiring Critical Thinking in individual and Groups. Defining problems and making critical decisions, Critical Thinking for personal goal setting				

Year IV Semester II				
BSc Honours Degree in Applied Physics				
PST 42801	Project Work: B.Sc. Thesis in Applied Physics			TH
Industrial/ laboratory studies on a research problem relevant to Physical Sciences, Students will be required to conduct either research or survey related to physics, chemistry or computer science/ Information Technology either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

PST 42102	Literature Search Seminar in Applied Physics	T		
A topic would be provided where the student is required to conduct a literature survey and present the obtained data at a seminar series				

PST 42203	Independent Research / Project in Applied Physics		P	
Independent practical will be conducted on one or more on the given topics				

BSc Honours Degree in Chemical Technology				
PST 42804	Project Work: B.Sc. Thesis in Chemical Technology			TH
Industrial/ laboratory studies on a research problem relevant to Chemical Sciences, Students will be required to conduct either research or survey related to, chemistry either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

Year IV Semester II				
PST 42805	Project Work: BSc Thesis in Computer Science & Technology			TH
The research problem should be selected from any area in Computer Science. The research project will be stretched throughout the year, during the semesters I and II. It will include three progress reports, a dissertation, and an oral presentation. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 4th week of the semester I. A dissertation should be submitted at the end of semester II and presented and defended in front of an Examination Committee appointed by the department. A guideline for the preparation of the dissertation will be given separately.				

PST 42606	Industrial Training		P	
Each student will undergo full time training to carry out tasks of the project assigned by the industry. The duration of the project period should be 15 weeks. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester. A guideline for the preparation of the report will be given separately.				

Rules and Regulations:

1. To obtain a minimum grade of D+ for each English language component (i.e. General English I, General English II, Academic English I, Academic English II

and Business English) offered in the first five semesters is also a compulsory requirement to be eligible for graduation.

2. In order to be eligible for the end-semester examination of a course unit, a student must have at least sat for the end-semester exam of each of the prerequisite course units (irrespective of the grade obtained), if any, listed under that course unit.
3. A student should maintain 80% attendance in each course unit in order to become eligible for the end-semester examination of that particular course unit. If the attendance falls below 50%, the student is considered to have failed the course unit and the student may sit for the end-semester exam in the following academic year and it will be considered the student's second attempt at the exam. If the attendance lies between 50% and 80%, a student may become eligible for the end-semester exam as recommended by the instructor in charge of the course unit (based on additional assessment procedures set by the instructor to evaluate the student's competence in the course unit).