

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

B.Sc.CHEMISTRY (Affiliated Colleges)

LEARNING OUTCOME BASED CURRICULUM

(For those who joined from 2021-2022 onwards)

VISION AND MISSION OF THE UNIVERSITY

VISION

" To provide quality education to reach the unreached "

MISSION

- To conduct research, teaching and outreach programmes to improve conditions of human living
- To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity
- To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development
- To provide quality / inclusive education, especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled

VISION AND MISSION OF DEPARTMENT

VISION

To make the students excel in the fields of education, fundamental and advanced research in Chemistry by providing quality education so that they can compete and contribute to the varying *technology*.

MISSION

1. To teach the students to analyze problems ranging from the basics of Chemistry to advanced level.
2. To give the students adequate hands on experience to work in applied fields.

3. To train the students to act as a useful member or effective leader of a team in multidisciplinary setting.

PREAMBLE

The B.Sc Chemistry programme is fundamental to the revolution taking place in Science and Technology. The aim of the programme is to impart basic skills and knowledge on the principles of all branches of Chemistry to cater to need of Society, Scientific Organization and Industries in the context of developing needs of our country by providing extensive coverage on the fundamental aspects of chemistry relating applications of chemistry to life systems. This course provides intensive practical training to develop associate and apply various aspects of chemistry in day to day life .The programme prepares the students to achieve success in competitive examinations and make developments of needs of their life.

Eligibility for the B.Sc Chemistry Programme

B.Sc Chemistry is a three year Undergraduate course which one can apply after completing 12th from science stream. Eligibility for the course says that the interested must have science with subjects as Physics, Chemistry, Mathematics, Biology or Computer Science as their main subjects from any recognized board.

PROGRAMME STRUCUTRE

SEM	Part	SUB. No	SUBJECT STATUS	SUBJECT TITLE	contact hrs /wk	L hrs /wk	P hrs /wk	credits
I	I	1	Language	Tamil/Other Languages	6	6	0	4
	II	2	Language	Communicative English – I	6	6	0	4
	III	3	Core I	Inorganic Chemistry – I	4	4	0	4
	III	4	Core II	Professional English for Physical Science –I	4	4	0	4
	III	5	Major Practical I	Inorganic quantitative (Volumetric) Analysis – I	2	0	2	2
	III	6	Allied Course I	Allied Chemistry – I	4	4	0	3
	III	7	Allied Practical I	Allied Chemistry Practical- I	2	0	2	2
	IV	8	Common	Environmental Studies	2	2	0	2
			SUB TOTAL		30	26	4	25
II	I	9	Language	Tamil/Other Languages	6	6	0	4
	II	10	Language	Communicative English – II	6	6	0	4
	III	11	Core III	Organic Chemistry – I	4	4	0	4
	III	12	Core IV	Professional English for Physical Science-II	4	4	0	4
	III	13	Major Practical II	Inorganic quantitative (Volumetric)Analysis – II	2	0	2	2
	III	14	Allied Course II	Allied Chemistry – II	4	4	0	3
	III	15	Allied Practical-II	Allied Chemistry Practical- II	2	0	2	2
	IV	16	Common	Social Value Education	2	2	0	2
			SUB TOTAL		30	26	4	25

III	I	17	Language	Tamil/Other Languages	6	6	0	4
	II	18	Language	English	6	6	0	4
	III	19	Core V	Physical Chemistry – I	4	4	0	4
	III	20	Major Practical III	Organic Preparation & Inorganic Qualitative Analysis - I	2	0	2	2
	III	21	Allied Course II	Allied Chemistry – I	4	4	0	3
	III	22	Allied Practical II	Allied Chemistry Practical- I	2	0	2	2
	III	23	Skilled Based Course I	Green Chemistry/Food Chemistry	4	4	0	4
	IV	24	Non-Major Elective I	Food Science /Water Management	2	2	0	2
	IV	25	Common	Yoga	2	2	0	2
				SUBTOTAL	30+2	26+2	4	27
IV	I	26	Language	Tamil/Other Languages	6	6	0	4
	II	27	Language	English	6	6	0	4
	III	28	Core VI	Inorganic Chemistry – II	4	4	0	4
	III	29	Major Practical IV	Inorganic Qualitative Analysis – II	2	0	2	2
	III	30	Allied Course II	Allied Chemistry – II	4	4	0	3
	III	31	Allied Practical II	Allied Chemistry Practical- II	2	0	2	2
	IV	32	Skilled Based Course II	Pharmaceutical chemistry/ Industrial Chemistry	4	4	0	4
	IV	33	Non-Major Elective II	Dairy Chemistry / Chemistry in Everyday life	2	2	0	2
	IV	34	Common	Computers for Digital Era	2	2	0	2
	V	35	Extension Activity	NCC/NSS/YRC/YWF	-	-	-	1
				SUBTOTAL	30+2	26+2	4	28
	III	36	Core VII	Organic Chemistry – II	6	6	0	4

V	III	37	Core VIII	Physical Chemistry – II	6	6	0	4
	III	38	Major Elective I	Polymer Chemistry / Bio Chemistry	4	4	0	4
	III	39	Major Elective II	Modern Instrumental Analytical Techniques/ Applied Chemistry	4	4	0	4
	III	40	Major Practical V	Organic Analysis & Physical Constant Determination	8	0	8	4
	III	41	Major Practical VI	Gravimetric Estimation & Inorganic Preparation				
	IV	42	Skill Based Common	Personality Development / Effective Communication / Youth Leadership	2	2	0	2
				SUBTOTAL	30	22	08	22
VI	III	43	Core IX	Inorganic Chemistry – III	5	5	0	4
	III	44	Core X	Organic Chemistry - III	5	5	0	4
	III	45	Core XI	Physical Chemistry – III	5	5	0	4
	III	46	Major Elective III	Textile Chemistry / Nano Chemistry	4	4	0	4
	III	47	Major Practical VII	Physical Chemistry Experiments	4	0	4	2
	III	48	Major Project	Major Project	7		7	7
				SUBTOTAL	30	19	11	25
				GRANDTOTAL	180+4	145+4	35	152

Skill Based Course

One among the two given course will be selected.

Non-Major Elective

One among the two given course will be selected.

Major Elective

One among the two given course will be selected.

Major Project

Group Project –Maximum of five students per group

Extension Program for the Department

Apart from the curriculum, to enrich the skill development of the students following courses in

their premises are conducted.

Effective Communication

Personality development

Youth development

EVALUATION SCHEME

B.Sc Chemistry curriculum is divided and studied in six semesters. The internal assessments and external examination are the two parts of evaluation scheme. The external theory and practical examinations will be conducted by the university at end of each semester.

There is a separate passing minimum of 40% for the external and overall components.

Distribution of marks between Internal and External Assessment for Core, Skill Based, Non-Major Elective, Major Elective and Allied Courses.

★ Theory Marks 25 : 75

★ Practical Marks 50 : 50

Pass minimum of 40% for external and overall components.

1. Internal Assessment .

Internal Marks for **Theory** shall be allotted in the following manner

The average of the best two tests from three compulsory tests. Each test is of one hour duration	20 Marks
Assignment	05 Marks
Total	25 Marks

Distribution of marks between Internal and External Assessment
for skill based elective Course- 25 : 75

The average of the best two from three compulsory tests. Each test is of one hour duration	20 Marks
Assignment	05 Marks
Total	25 Marks

2. Internal Marks for **Practical** shall be allotted in the following manner

Experimental Work	25 Marks
Regularity	25 Marks
Total	50 Marks

3. Marks for **Major Project** shall be allotted in the following manner

Internal Marks : 50

External Marks: 50

Internal Marks for Project:

Components	Marks
Experimental work	25 Marks
Project report	25 Marks
Total	50 Marks

External evaluation of Project

Project report evaluation and Viva-Voce will be conducted by both the External examiner and the Guide at the end of the semester.

4. The question pattern for all theory courses shall be as follows.

Duration of Exam: 3 Hours

Section	Type of questions	Mark
Part-A	Multiple choice question (Two question from each unit compulsory)	$1 \times 10 = 10$ Marks
Part-B	Internal Choice questions (One question from each unit: either/or)	$5 \times 5 = 25$ marks
Part-C	Internal Choice questions (One question from each unit: either/or)	$8 \times 5 = 40$ marks
	Total	75 Marks

MODEL QUESTION
INORGANIC CHEMISTRY I Maximum Marks : 75 Time : 3 hrs
 Answer ALL the Questions in ALL Parts

	Part A 10 ×1=10 marks Choose the correct answer	COURSE OUTCOME	COGNITIVE LEVEL
1.	The de-Broglie equation is a. $\lambda = h/ mv$ b. $\lambda = mv/ h$ c. $v = \lambda/h$ d. none of these	R	K1
2.	The maximum no of electrons in each sublevel is a. 4 b.2 c. 0 d. 6	R	K1
3.	Covalent nature of N ₂ is a. 40pm b.60pm c.7pm d. 110pm	R	K1
4.	IE of an element does not depend on nuclear charge b. penetration effect c. Shielding effect d. Electronegativity	U	K2
5.	Which of the following molecule is planar? a .PCl ₃ b. ClO ⁴⁻ c. CO ₃ ²⁻ d. NH ₃	R	K1
6.	On the basis of LCAO-MO theory the magnetic characteristics of N ₂ and N ₂ ⁺ are a. N ₂ is paramagnetic and N ₂ ⁺ is diamagnetic b. N ₂ ⁺ is diamagnetic and N ₂ is paramagnetic c. Both are paramagnetic d. Both are diamagnetic	A	K3

7.	Which of the following element(s) is/are s-block ? a. H b. Li c. Na d. All of these	R	K1
8.	The hydroxides of s-block elements are a. acidic b. basic c. neutral d. Both a and b	U	K2
9.	Which of the following cation is precipitated in acidic medium ? a. Pb^+ b. Cu^+ c. Zn^{2+} d. Mg^{2+}	R	K1
10.	The titration using self indicator is a. Permanganometry b. Dichrometry c. Complexometry d. All of these	U	K2
	PartB 5 x 5 = 25 marks Choosing either (a) or (b)		
11.	a. Explain the dual nature of de-Broglie equation OR b. (i) Illustrate Eigen value & Eigen function (ii) Significance of φ & φ^2	U	K2
12.	a Explain the following terms with example (i) Ionization Energy (ii) Covalent radii (iii) Electron affinity (iv) Electro negativity OR b. Write the importance of modern periodic table and their classification	E	K5
13.	a. Define Lattice energy and Born-Lande equation with an example OR		

	b. What is Born-Haber Cycle & give its application	R	K1
14.	a. Elaborate on diagonal Relationship with suitable example OR b. Discuss the structure of any two silicates.	C	K6
15.	a. Examine the acid and basic radicals in the salt mixture OR b. Explain the principles of Gravimetric analysis in Homogeneous solutions	E	K5
16	PartC 5 x 8 = 40 marks a. Explain the photoelectric effect and sommerfield theory. OR b. Explain the terms i) Pauli's Exclusion Principle (ii) Hund's rule (iii) Aufbau principle	E	K5
17.	a. Discuss the factors affecting ionization energy OR b. How will you determine the electro negativity? Explain about it?	C	K6
18.	a. Apply VSEPR Theory to determine the geometry of molecules . OR Construct MO of HF and write its consequences.	A	K3

19.	a. Relate the periodicity of s and p-block element with respect to IE and EA <p style="text-align: center;">OR</p> b. Illustrate intercalation compound ? Explain it with example	U	K2
20.	a. Select the suitable indicators for various volumetric analysis <p style="text-align: center;">OR</p> b. What are the steps to be taken in laboratory to minimise the errors.	R	K1

K 1 –Remember K 2 – Understand K 3 - Apply K 4 – Analyze K 5 –Evaluate K 6 - Create

Program Outcomes (POs)

On successful completion of the Undergraduate Program the graduates/ students will be able to

PO1 Understand the basics of science and apply their knowledge in day-to-day life

PO2 Develop skills to carry out experiments in various branches of science.

PO3 Have enough scientific knowledge to go for higher studies and become entrepreneur

PO4 Identify, formulate and solve the technological problems of the industry

PO5 Effective written and oral communication skills especially the ability to transmit complex technical information in a clear and concise manner

PO6 Understand the issues of environmental contexts and sustainable development.

PO7 Acquire professional ethics and act in a non-biased manner

Programme Specific Outcomes (PSOs)

After completing B.Sc Chemistry program the students will be able to

PSO1 Have sound knowledge about the fundamentals and applications of chemical and scientific theories.

PSO2 Acquire a skill for safer handling of chemicals, apparatus and instruments.

PSO3 Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and industries.

PSO4 Develop analytical skills and problem solving skills requiring application of chemical principles.

PSO5 Acquire the ability to synthesis, separate and characterize compounds using laboratory and instrumentation techniques.

PSO6 To provide the professional service to industry, research organization and institutes.