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**IT 2301 INFORMATION ASSURANCE AND SECURITY**

ACADEMIC SYLLABUS

November 7, 2017

Revision History

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| --- | --- | --- | --- | --- | --- |
| **Version** | **Item(s)** | **Revised By** | **Revision Date** | **Approved by** | **Approved Date** |
| 1.0 | First version of Syllabus | **Godwin S. Monserate** | Nov. 7, 2017 | **Mary Jane G. Sabellano, MSIT** |  |

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**Course Information**

Course No. : IT 2301

Course Title : Information Assurance and Security 1 (IAS 1)

Course Credit : 3 units lecture 2 units Laboratory

Course Equivalent(s) **:**

Course Pre-Requisite(s) :

Course Co-Requisite(s) : None

Term : AY2017-2018 2nd Semester

Room and Schedule:

**Teacher Information**

Name : Godwin S. Monserate

Consultation Time : 7:30 am - 10:30 pm MW Daily at CISCO Lab

Office: LB465, Department of Computer Science, Lawrence Bunzel Building, USC Talamban Campus

Contact Information: sir\_gsm@yahoo.com / 230-0100 Local 158

Course Description

The Information Assurance and Security as a domain is the set of controls and processes both technical and policy intended to protect and defend information and information systems by ensuring their availability, integrity, authentication, and confidentiality and providing for non-repudiation. The concept of assurance also carries an attestation that current and past processes and data are valid. Both assurance and security concepts are needed to ensure a complete perspective. Information assurance and security education, then, includes all efforts to prepare a workforce with the needed knowledge, skills, and abilities to protect our information systems and attest to the assurance of the past and current state of processes and data.

This course includes topics such as concepts and principles of secure design, defensive programming, threats and attacks, network security, cryptography, web and platform security, security policy and governance, digital forensics, and secure software engineering.

Institutional Learning Outcomes

|  |  |
| --- | --- |
| **Core Values** | **Attributes** |
| SCIENTIA: *competent* | a. Intellectually superior: critical thinking, analytical reasoning, problem solving, articulate communication, writing skills |
| b. Professionally reliable: technical skills are up-to-date, market – responsive, versatile |
| c. Life-long learner: sound foundations in science and arts for future redevelopment |
| VIRTUS:  *noble in character* | a. Morally literate and ethically critical: sense of personal integrity, balance between ethical ideals and realistic decision-making |
| b. Professionally moral: compliant with one’s codes of professional ethics but also critically objective of communal professional practice |
| c. Religiously literate and Spiritually engaged |
| DEVOTIO: *communitarian* | a. Public service oriented: compassionate particularly for the excluded |
| b. Culturally Sensitive: grounded in cultural distinctiveness yet tolerant of social diversity |

Program Educational Objectives

|  |  |  |
| --- | --- | --- |
| **Code** | **Program Educational Objectives** | **Core Value Activated** |
| PEO1 | A Computer Science graduate will demonstrate computing competency, leadership and lifelong-learning throughout their profession. | Scientia |
| PEO2 | A Computer Science graduate will embody the values of a holistic Carolinian, committed in their profession and society. | Virtus |
| PEO3 | A Computer Science graduate will be socially responsible individuals capable of developing community-responsive interdisciplinary solutions. | Devotio |

Program Outcomes

|  |  |  |  |
| --- | --- | --- | --- |
| **P.O. Attribute** | **Code** | **Program Outcomes** | **Core Value Activated** |
| Knowledge for Solving Computing Problems | ICT01 | Acquire, synergize and apply with excellence the computing fundamentals, various algorithmic principles, technical concepts and practices, best practices and standards in the application of core information technologies in numerous application environments, mathematics, science, and domain knowledge appropriate for the information technology practice to the abstraction and conceptualization of solution models from defined problems and requirements by deepening one’s insight to the full. | Scientia  Virtus |
| Problem Analysis | ICT02 | Fully determine, formulate, investigate related research works and analyze user or domain needs to solve multidisciplinary and communal information technology problems accomplishing practical software solutions that are applicable and beneficial to society using fundamental principles of mathematics, computing fundamentals, technical concepts and practices in the core information technologies, and relevant domain disciplines. | Scientia  Devotio |
| Design / Development of Solutions | ICT03 | Design and evaluate with prudence optimum solutions for multidisciplinary and communal computing problems, and software systems, of varying levels of complexities, components, or computing processes that meet specified user needs taking into account design choices with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. Able to diligently assist in the creation of an effective project plan and integrate efficient IT-based solutions that includes selection, creation, evaluation, and administration of IT Systems appropriate to the user environment. Able to diligently assist in the creation of an effective project plan and integrate efficient IT-based solutions that includes selection, creation, evaluation, and administration of IT Systems appropriate to the user environment | Scientia  Virtus  Devotio |
| Modern Tool Usage | ICT04 | Create, select, adapt and apply effective and efficient techniques, resources, and suitable modern computing tools to complex computing activities, with an understanding of the limitations in service of humanity. | Scientia  Virtus  Devotio |
| Individual and Team Work | ICT05 | Able to work independently and indiscriminately collaborate as a member or leader in diverse teams in computing activities, multidisciplinary settings, and “glocalized” communities. | Virtus |
| Communication | ICT06 | Communicate effectively and decently with the computing community and with society at large ( in local and international scenes) about complex computing activities by being able to comprehend and write effective reports, design documentation, make and deliver effective presentations, and give and understand clear instructions | Scientia  Virtus |
| Computing Professionalism and Society | ICT07 | Comprehend and assess thoroughly the impact of software solutions and computing to health, safety, cultural, legal and environmental concerns within “glocalized” context; and develop, nurture and apply a sense of social responsibility. | Scientia  Virtus  Devotio |
| Ethics | ICT08 | Understand, demonstrate and live an ethical and moral profession in the development, usage and presentation of theories, research and software solutions; and peer collaborations based on moral and professional standards to benefit society. | Virtus  Devotio |
| Life-Long Learning | ICT09 | Recognize and appreciate the relevance of computing principles and theories in the cooperative life journey and apply current and emerging technologies to continuously evolve as a computing professional who can contribute to society’s development and progress. | Scientia  Virtus  Devotio |

Course Outcomes

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Course Outcomes** | **Core Values Activated** | | | **Program Outcomes (POs) Activated**  **I:Introductory,E:Enabled,D:Developed** | | | | | | | | | | | | | **Domain of Learning & Level** |
| *Upon completion of the course students should be able to:* | | **S** | **V** | **D** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |  |
|  |  |  | Knowledge for Solving Computing Problems | Knowledge for Solving Computing Problems | Problem Analysis | Problem Analysis | Design & Development Solutions | Design & Development Solutions | Modern Tool Usage | Individual and Teamwork | Individual and Teamwork | Communication | Computing Professionalism & Social Responsibility | Computing Professionalism & Social Responsibility | Life-Long Learning |  |
| CO1 | Explain the concept of Information Assurance and Security in pertaining to information protection against threats and attacks. |  |  |  | **I** |  |  |  |  |  |  |  |  |  |  | **I** | **I** |  |
| CO2 | Simulate and Explain different network security in preventing and protecting the exchange of information over the network. |  |  |  | **E** |  | **E** |  | **E** |  | **E** |  |  |  |  | **E** | **E** |  |
| CO3 | Apply digital forensics to preserve any evidence in its most original form while performing a structured investigation by collecting, identifying and validating the digital information for the purpose of reconstructing past events. |  |  |  | **I** |  | **I** |  | **I** |  | **I** |  |  |  |  | **I** | **I** |  |
| CO4 | Develop own algorithm for encrypting and decrypting messages or files; and create program using the algorithm using any programming languages. |  |  |  | **E** |  | **E** |  | **E** |  | **E** |  |  |  |  | **E** | **E** |  |

Course Deliverable Outputs and Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Output / Requirement | Output / Requirement Description | CILO addressed | Type of Assessment | |
| Course Project | Each student is tasked to develop an algorithm for encrypting and decrypting messages or files; Using any programming languages the students will develop a program based on the algorithm they developed. | 1, 2 & 3 | Rubric-Based | Summative |
| Learning Logs for Laboratory Activities, Case Studies, and reflections | Deliverables of this requirement includes case study write ups, experiences, thoughts, reflections and conclusion with regards to the topic assigned.  Network design will be simulated in a laboratory using Packet Tracer software | 1, 2 & 3 | Rubric-Based | Summative |
| Term Papers | Students are required to research for particular topic that would help them increase their knowledge with regards to the area being asked. The research output maybe in a form of oral, written or practical application. | 1, 2 & 3 | Rubric-Based | Formative |
| Quizzes | Quizzes are given to students to check their familiarity and understanding at the end of a unit or a group of units discussed. | 1, 2 & 3 | Non-Rubric-Based | Formative |
| Exams | Exams are given to students to check their familiarity and understanding at the end of mid-term or final term. This maybe in a form of oral, written or practical application. | 1, 2 & 3 | Non-Rubric-Based | Summative |

Grading System

|  |  |  |  |
| --- | --- | --- | --- |
| Outputs | Type | Weight | Computation |
| Network Simulation Exercises (NSE) | Rubric Based | 15% | SQ Grade x 0.10  A Grade x 0.05  NSE Grade x 0.15  TP Grade x 0.15  P Grade x 0.15  ME Grade x 0.20  FE Grade x 0.20  Total GRADE 1.0 |
| Term Paper (TP) | 15% |
| Project (P) | 15% |
| Short Quizzes (SQ) | Non-Rubric-Based | 10% |
| Assignments (A) | 5% |
| Midterm Exam (ME) | 20% |
| Final Exam (FE) | 20% |
| **Total** | 100% |  |  |
|  | |  | **Passing Grade: 3.0 Condition for Passing:**  NSE, TP and P should be submitted with the grade of 3.0, if the student fail to submit any of the mentioned items, student final grade will be 5.0 |

Assessment Criteria

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ORAL PRESENTATION (Case Study/Project)** | | | | |
| **CRITERIA** | **EXCELLENT** | **COMPETENT** | **AVERAGE** | **NEEDS IMPROVEMENT** |
| **1.0** | **2.0** | **3.0** | **5.0** |
| **Content**  **30%** | Demonstrates full knowledge (more than required) by answering all questions with explanations and elaboration. | At ease with expected answers to all questions, but fails to elaborate. | Uncomfortable with information and is able to answer only basic questions. | Does not have grasp of information. Student cannot answer questions about the system. |
|  | All information provided in the system is accurate and all the system requirements have been met. | Almost all the information provided in the system is accurate and all system requirements have been met. | Almost all of the information provided in the system is accurate and almost all of the system requirements have been met. | There are several inaccuracies in the content provided in the system or many of the system requirements were not met. |
| **Correctness of**  **Facts**  **10%** | Properly supports the key ideas with facts | Supports key ideas without a concrete fact. | Supporting facts provided does not backup the key idea. | Most facts are wrong. |
| **Organization**  **10%** | Presents information in logical, interesting sequence which the audience can follow. | Presents information in logical sequence which the audience can follow. | Audience has difficulty following the project presentation. | Audience cannot understand the project presentation because there is no sequence of information. |
| **Mastery of Software Functionalities**  **40%** | Has an exceptional understanding of the system and can easily answer questions about the content and processes used in the system. | Has a good understanding of the system and can easily answer questions about the content and processes used in the system. | Has a fair understanding of the system and can easily answer most questions about the content and processes used in the system. | Does not appear to learn much from the project and cannot answer most questions about the content and the processes used in the system. |
| **Presentation**  **10%** | Speaks clearly and distinctly all (95-100%) the time, mispronounces no words at all, and presents well without reading the slides, or looking at extra notes at all. | Speaks clearly and distinctly all (95-100%) the time, but mispronounces few (1 – 5) words, and reads the slides or looks at extra notes 25% of the time. | Speaks clearly and distinctly most (85-94%) of the time and mispronounces few (1 – 5) words, and reads slides or looks at extra notes 50% of the time. | Often mumbles or cannot be understood or mispronounces a number (more than 5) of words and reads the slides or extra notes all the time. |
|  | Business attire, very professional look. | Casual business attire. | Casual business attire, but wore sneakers or seemed somewhat wrinkled. | General attire not appropriate for audience (jeans, t-shirt, shorts). |

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| --- | --- | --- | --- | --- |
| **SKILLS BASED ACTIVITIES** | | | | |
| Level  Criteria | Outstanding | Competent | Marginal | Not Acceptable |
| 1.0 | 2.0 | 3.0 | 5.0 |
| Configuration of Devices and Results Obtained | The solution to the network problem is more appropriate based on the configurations set to the devices, and the overall results are accurate and consistent. | The solution to the network problem is appropriate based on the configurations set to all devices, and most of the overall results contains minimal errors and issues. | The solution to the network problem is appropriate based on the configurations set to all devices but the overall results are contains major errors and issues. | The solution may be not be appropriate based on the configurations set but the overall results are erroneous. |
| Network Simulation and/or Implementation | The simulated network and/or implemented networks are working without any issues. | The simulated network and/or implemented network are working but with minimal issues. | The simulated network and/or implemented networks are working with major issues. | The simulated network and/or implemented network is not working. |

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| **PROGRAMMING RUBRIC (Project)** | | | | |
| Level  Criteria | Outstanding | Competent | Marginal | Not Acceptable |
| 1.0 | 2.0 | 3.0 | 5.0 |
| Specifications  (40%) | The program executes properly and meets all of the specifications. | The program executes properly and displays the correct results. Most of the specifications are met. | The program produces correct results but does not display them properly. | The program produces erroneous output. |
| Robustness  (30%) | The program contains exceptional measures that will cater any possible erratic interaction from the users, with very good recovery. The program compiles with no warnings. | The program contains considerable measures that will cater any erratic interaction from the users, with reasonable recovery. The program compiles without any warnings. | The program contains limited measures in catering any erratic interaction from the users. There may be some attempts in detecting and correcting the errors during the checking of the laboratory exercise. The program compiles and run without crashing. | Little or no error detection is present in the program that will cater any erratic interaction from the users. The program doesn’t compile or compiles but crashes. |
| Efficiency and Modularity  (20%) | The code is excellent without sacrificing readability and understanding. The program is completely modular, more than one level of function calls. | The code is efficient without sacrificing readability and understanding. The program is completely modular, at least one level of function calls. | The code is in brute force manner, unnecessarily long. The program is somewhat modular with several function calls. | The code is long and appears to be patched together. The whole program only contains the main module only. |
| Documentation of Solution  (10%) | The solutions, algorithms used, figures and other supporting information are clearly illustrated in the document. The document format effectively facilitates easy reading and very minimal effort in getting an overview of the content. | The solutions, algorithms, figures and other supporting information are vaguely illustrated in the document. The document format effectively facilitates easy reading and very minimal effort in getting an overview of the content. | The solutions, algorithms, figures and other supporting information are not clearly illustrated in the document. The document format does not facilitate easy reading and requires effort on the reader to get the overview of the content. | No document is presented. |

Learning Plan

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| --- | --- | --- | --- |
| **LEARNING PLAN** | | | |
| **Course Outcome** | **Topics** | **Week** | **Learning Activities** |
| CO1 | Overview of Information Assurance | 1 | In-Class   * Active listening to the course orientation * Participating in the open forum * Lecture Discussion * Assignment Online   Outside Class   * Introducing topics from experiences and personal knowledge |
| CO1 | The need for security: threats, attacks and assets | 2 | In-Class   * Online Reading * Active listening to a short lecture * Discussion of Assignment * Short Quiz   Outside Class   * Look for Reading Materials * Research |
| CO1 | Legal and Ethical Issues of Information Security  Security policy, standards and practices  Security Plans  Security Education | 3 | In-Class   * Online Reading * Active listening to a short lecture * Drafting of Security Plans * Presentation of Security Plans * Submission of Assignment Movie Synopsis: Swordfish (IT Security Related Movie) Starring Hugh Jackman, Halle Berry, and John Travolta * Short Quiz   Outside Class   * Look for Reading Materials * What Online Movie * Research |
| CO1 | Contingency plans  Continuity plans  Mitigating Plan  Risk Assessment Plans | 4 | In-Class   * Online Reading * Active listening to a short lecture * Drafting of Plans * Presentation of Plans * Short Quiz   Outside Class   * Look for Reading Materials * Research * Prelim |
| CO1, C02 | Telecommunications, Network, and Internet Security  Security Technology: Firewalls, VPNs, and Wireless | 5-6 | In-Class   * Active listening to a short lecture * Performing Packet Tracer Activities: implementing IPv4 and IPv6 static and dynamic addressing in the test environment shown in the given topology * Short Quiz   Outside Class   * Research * Doing Packet Tracer Exercises |
| CO1, C03 | Digital Forensics | 7-10 | In-Class   * Active listening to a short lecture * Digital Forensic Activity: Implementing the procedures in securing, preserving of evidences * Digital Forensic Activity: Creating Digital Imaging, processing and analyzing of evidences * Presentation of outputs * Short Quiz   Outside Class   * Research * Doing Digital Forensics Exercises * Midterms |
| CO1, C04 | Concepts and principles of secure design   * Defensive programming * Dangerous of Invalid Input   + Integer Overflow,   + Automated input,   + Invalid input format * How to do Input Validate   + Whitelisting and   + Blacklisting * Static/Dynamic Security Testing and Race Condition * Data Sanitization * Output Encoding (slides) (Tutorial) * https://sites.google.com/site/smsdproject/home/data-sanitization-for-input-validation/hands-on-lab-practice | 11-12 | In-Class   * Active listening to a short lecture * Presentation of output for the Case Study: Develop a Login Validation project that contains two labs (input checking and secure coding) we discussed.   Outside Class   * Research * Programming Exercises |
| CO1, C04 | Web and platform security and secure software engineering. | 13-14 | In-Class   * Active listening to a short lecture * Let student join the website NOVA Labs and answer the activities pertaining to cybersecurity web and platform security. See link below: http://www.pbs.org/wgbh/nova/labs/lab/cyber/ * Presentation of Output * SemiFinal |
| CO1, C04 | Cryptography and Steganography  Cryptography: Secret Key Algorithms (DES,3DES,IDEA,AES), Block ciphers: ECB, CBC, OFB, CFB, CTR  Cryptography: Hashes, Message Digests, Message and Identity Authentication, Karn Symmetric Encryption | 15-17 | In-Class   * Active listening to a short lecture * Developing Algorithm/formula for public key encryption * RSA Public-Key Encryption Exercise * Key-Sharing Exercise * Presentation of Lab Activity for Programming: Encryption and Decryption of files * Finals |

Classroom and Laboratory Policies

This course will adhere to all the stipulated class policies in the USC Student Manual.

The students are expected to observe the following specific policies during class sessions:

1. Active participation creates a more dynamic learning environment. Students should be always prepared in sharing, presenting and demonstrating their research and reading assignments. Also, the rest of the students must also participate in the discussion by commenting, or sharing their own perspective and readings. Students are encouraged to present their research assignments in PDF or PPT file types for easy dissemination and presentation.
2. Group work requires group effort. It is expected that every member exerts his/her best in delivering the outputs required. Though division of labor can be applied, all the members are expected to understand and appreciate all the steps undertaken to produce the output. All group works will have necessary validation activities to verify the learnings of the students involved.
3. Attend class regularly. Students are expected to be on time and present all the time. Students are only allowed 7 absences. The student is identified as tardy if he or she comes in class within 15 minutes. 3 tardiness is equal to 1 absence.
4. Cellular phones, tablets, laptops and other similar devices must be switched off or put into silent mode. Usage of such devices will only be allowed if the teacher deemed it necessary for the students’ learning.
5. No food and drinks are permitted inside the laboratory to avoid spillage and to prevent insects and other pests.
6. Each student will be assigned with a date to lead the class in prayer before the start of the session. Students may solicit in advance to his/her classmates prayer intentions like birthday celebrations or any other important events.

# **Bibliography**

|  |  |  |  |
| --- | --- | --- | --- |
| **Books** | | | |
| Call Number | Title | Author | Year |
|  | Information Assurance  1st Edition  Dependability and Security in Networked Systems  eBook ISBN: 9780080555881  ISBN: 9780123735669 | Authors: Yi Qian David Tipper Prashant Krishnamurthy James Joshi | 2007 |
|  | Malware, Rootkits and Botnets  ISBN: 9780071792066  Publication Date: 2012 | Christopher Elisan | 2012 |
|  | Principles of Information Security  6th Edition  Copyright 2018Published Cengage | Michael E. Whitman | Herbert J. Mattord | 2018 |
|  | Cybersecurity: The Essential Body Of Knowledge  1st Edition  Copyright 2012Published Cengage | Dan Shoemaker | Wm. Arthur Conklin | 2012 |
|  |  |  |  |
| **Online Sources** | | | |
| Cisco Networking Academy – Cybersecurity : netacad.com  Nova Laboratory: http://www.pbs.org/wgbh/nova/labs/lab/cyber/  Laboratory Exercises on Encryptioin: http://pages.csam.montclair.edu/~benham/enclabs/index.html | | | |