**Tunisian Republic**
**Private Higher School of Engineers of Gafsa**
**Private Higher Education Institution,**
**State-approved under N° 05-2013**

| | |
|---|---|
| Course Title: | **Design and development projects** |
| Course Code: | CSE411 |
| Program: | Master Degree In Computer Engineering |
| Department: | Computer Engineering |
| Course coordinator: | Dr. Thouraya GOUASMI |
| Institution: | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

1. **Credit hours:** **3 (1.5-0-1.5)**

**2. Course type**

**a.** College ☐ Department ☒ Others ☐

**b.** Fundamental ☒ Transversal ☐ Optional ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course (if any):**
supervised projrct I, supervised projrct II

1. **Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 36 | 81 |
| 2 | **Blended** | ….. | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other (Project)** | 45 | | |

2. **Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | - |
| 2 | **Laboratory/Studio** | - |
| 3 | **Tutorial** | - |
| 4 | **Others**(Project) | 45 |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

### Course Description

This course is presented in the form of projects on which the ideas of the projects are proposed for each group, and at each session the teacher follows the progress of the design and realization of each project. Each group will share the tasks between them according to a development cycle model (scrum or other), design all the UML diagrams corresponding to their project, implement their application, create their database, and deploy it on one platform.

### Course Main Objectives

- ✓ Train students to prepare a scope of work that adequately describes their problem or project.
- ✓ Make groups to work in a collaborative way using the modern methods of software engineering (agile method) and to share the tasks perfectly between them.
- ✓ Use a methodology of analysis and design of systems in their project and define well its design
- ✓ Develop their systems using the appropriate languages, software and platforms or frameworks and test them.
- ✓ Gain practical experience in present their projects and prepare an associated document.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | ✓ Train students to prepare a scope of work that adequately describes their problem or project. | PLO.K1 |
| 1.2 | ✓ Make groups to work in a collaborative way using the modern methods of software engineering (agile method) and to share the tasks perfectly between them. | |
| **2** | **Skills** | |
| 2.1 | ✓ Use a methodology of analysis and design of systems in their project and define well its design | PLO.S1 |
| 2.2 | ✓ Develop their systems using the appropriate languages, software and platforms or frameworks and test them. | PLO.S5 |
| 2.3 | ✓ Gain practical experience in present their projects and prepare an associated document. | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Project study | 4 |
| 2 | Prepare a specification document | 2 |
| 3 | Share tasks across the membership | 2 |
| 4 | Project design | 6 |
| 4 | Implementation(encoding) | 12 |
| 5 | Testing and maintenance | 4 |
| 6 | Demonstration of the final product | 3 |
| 7 | Writingreport | 6 |
| 8 | Oral presentation of 20 to 30 minutes | 6 |
| **Total** | | 45 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| PLO.K1 | ✓ Train students to prepare a scope of work that adequately describes their problem or project.<br>✓ Make groups to work in a collaborative way using the modern methods of software engineering (agile method) and to share the tasks perfectly between them. | - Class discussions<br>- Assignments<br>- Projects | Assignments,<br>Quizzes,<br>Report |
| **2.0** | **Skills** | | |
| PLO.S1 | ✓ Use a methodology of analysis and design of systems in their project and define well its design. | - Class discussions<br>- Assignments<br>- Projects | Assignments,<br>Quizzes,<br>presentation |
| PLO.S5 | ✓ Develop their systems using the appropriate languages, software and platforms or frameworks and test them.<br>✓ Gain practical experience in present their projects and prepare an associated document. | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Practical Work (written or oral) | Weekly | 100% |
| 2 | Quizzes, Homework assignments | Random | 00% |
| 3 | Exam | 16th | 100% |

## E. Student Academic Counseling and Support

| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:** |
|---|
| - Office hours<br>- Blackboard interface<br>- Academic advisor<br>- Bibliotic |

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | http://scrumalliance.org/<br>http://members.cox.net/risingl1/Articles/IEEEScrum.pdf<br>*https ://www.scrum.org* |
| **Essential References Materials** | |
| **Electronic Materials** | **Datashow** |
| **Other Learning Materials** | |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

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| | |
|---|---|
| **Course Title:** | Software engineering II |
| **Course Code:** | CSE412 |
| **Program:** | **Computer science Engineering** |
| **Department:** | **Computer Engineering** |
| **College:** | **ESIP** |
| **Institution:** | **ESIP** |

## A. Course Identification

1. **Credit hours:** **3 (2-1-0)**

**2. Course type**

**a.** University ☐ College ☐ Department ☒ Others ☐

**b.** Required ☒ Elective ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course** (if any)**: data srtucture, Formal logic**

**1. Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 30 | 75 |
| 2 | **Blended** | 45 | | |
| 3 | **E-learning** | …... | | |
| 4 | **Distance learning** | …... | | |
| 5 | **Other ()** | …... | | |

**2. Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 30 |
| 2 | **Laboratory/Studio** | - |
| 3 | **Tutorial** | 15 |
| 4 | **Others** (specify) | - |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

**Course Description**

- ✓ This course will introduce specification and formal verification in the development process of a software as well as we will learn a formal method: the method B and two formal verification techniques: (Proof of theorems, Model checking or model checking)

**Course Main Objective**

1. Raise awareness of the interest of introducing the methods formalities in the development cycle of a software.
2. Understand how to introduce formal methods in the development cycle of a software.
3. Define key terms in the field of formal methods
4. Present some formal specification formalisms
5. Analyze and evaluate the performance of formal verification techniques
6. Master the concept of software life cycle, and compare some classic and newer development processes.

### 1. Course Learning Outcomes

| CLOs | | AlignedPLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Raise awareness of the interest of introducing the methods formalities in the development cycle of a software. | PLO.K1 |
| 1.2 | Understand how to introduce formal methods in the development cycle of a software. | |
| 1.3 | Define key terms in the field of formal methods | |
| 1.4 | Present some formal specification formalisms | |
| **2** | **Skills** | |
| 2.1 | Master the concept of software life cycle, and compare some classic and newer development processes. | PLO.S1 |
| 2.5 | Analyze and evaluate the performance of formal verification techniques | PLO.S5 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Introduction to formal methods | 2 |
| 2 | Need for formal methods | 2 |
| 3 | Formal methods and development cycle | 2 |
| 4 | Behaviour, environment, properties | 2 |
| 5 | Verification Techniques, Abstract machine concept | 3 |
| 7 | The clauses of an abstract machine<br>Proof obligations | 3 |
| 8 | Definition and calculation of generalized substitutions<br>Data modeling notation | 3 |
| 9 | The refinement process: Refinement proof obligations | 3 |
| 10 | Modularity | 2 |
| 11 | Kripke structure | 2 |
| 12 | Temporal logic: PLTL | 3 |
| 13 | Temporal logic: CTL, CTL model checking algorithm | 3 |
| **Total** | | 30 |

## C. Tutorial Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Abstract Data Types | 4 |
| 2 | Abstract machine | 4 |
| 3 | Temporal logic: PLTL, CTL | 4 |
| 4 | Model Checking | 3 |
| **Total** | | 15 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| PLO.K1 | Raise awareness of the interest of introducing the methods formalities in the development cycle of a software. | Lecturing | Assignments, Quizzes , Exams, |
| | Understand how to introduce formal methods in the development cycle of a software. | | |
| | Define key terms in the field of formal methods | | |
| | Present some formal specification formalisms | | |
| **2.0** | **Skills** | | |
| PLO.S1 | Master the concept of software life cycle, and compare some classic and newer development processes. | Lecturing | Assignments, Quizzes , Exams, |
| PLO.S5 | Analyze and evaluate the performance of formal verification techniques | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 00% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **3** | First mid Term | 8 | 35% |
| **5** | Final Exam | 16 | 65% |

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

1- Office hours
2- Blackboard interface

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | 1-Roger S. Pressman, "Software Engineering: A Practitioner's Approach" (7th Edition) ISBN 978–0–07–337597–7 (2010)<br>2-J.B. Rosser, A. Church, A. Kleene, "Formal Methods: An Introduction to Symbolic Logic and to the Study of Effective Operations in Arithmetic and Logic"<br>http://pagesperso.lina.univ-nantes.fr/~andre-p/download/introMF.pdf |
| **Essential References Materials** | |
| **Electronic Materials** | ● Lecture material in PPT<br>● Any Related material including the YouTube videos relating to engineering measurement<br>Blackboard |
| **Other Learning Materials** | NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| **Evaluation Areas/Issues** | **Evaluators** | **Evaluation Methods** |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

ESIP
Ecole Supérieure d'Ingénieurs

| | |
|---|---|
| **Course Title:** | **Embedded systems** |
| **Course Code:** | CSE421 |
| **Program:** | Master Degree In Computer Engineering |
| **Department:** | Computer Engineering |
| **Course coordinator:** | Dr. Wajdi Saadaoui |
| **Institution:** | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

1. **Credit hours:** **3 (1.5-0.5-1)**

**2. Course type**

**a.** College ☐ Department ■ Others ☐

**b.** Fundamental ■ Transversal ☐ Optional ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course :** Computer architecture, programming

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 33 | 78 |
| 2 | **Blended** | 45 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 20 |
| 2 | **Laboratory/Studio** | 15 |
| 3 | **Tutorial** | 10 |
| 4 | **Others** (specify) | - |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

### Course Description

The "Introduction to Embedded Systems" course is designed for students in the 2nd year of an engineering cycle in computer science. It provides an in-depth understanding of the fundamental concepts, design and applications of embedded systems. Students will learn the characteristics and constraints of embedded systems, as well as hardware and software architecture. They will acquire practical skills in embedded programming, communication interfaces and embedded operating systems. The course also covers hardware design and optimizing performance and power consumption. Students will develop a solid understanding of the key principles needed to design, develop, and program embedded systems. This course prepares students to work in fields such as the Internet of Things, automotive, robotics and many others where embedded systems are essential.

### Course Main Objective

At the end of the module, the student should be able to:

- ✓ Develop an in-depth knowledge of the basic concepts of embedded systems, including their definition, characteristics and importance in different fields of application.
- ✓ Understand the architecture of embedded systems, including hardware components such as microprocessors, microcontrollers, memory, and peripherals, as well as associated programming logic and data structures.
- ✓ develop practical programming skills for embedded systems, using languages such as C/C++. They must be able to design, develop and debug software suitable for embedded systems.
- ✓ Acquire an in-depth knowledge of the different communication interfaces used in embedded systems, as well as commonly used protocols such as UART, SPI, I2C and wireless protocols.
- ✓ Understand the principles of embedded operating systems, with an emphasis on real-time systems. They must be able to manage tasks, scheduling and resource management in an embedded environment.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 2.1 | Understand the principles of embedded operating systems, with an emphasis on real-time systems. They must be able to manage tasks, scheduling and resource management in an embedded environment. | PLO.K2 |
| 2.2 | Understand the architecture of embedded systems, including hardware components such as microprocessors, microcontrollers, memory, and peripherals, as well as associated programming logic and data structures. | |
| **2** | **Skills** | |
| 2.1 | Develop an in-depth knowledge of the basic concepts of embedded systems, including their definition, characteristics and importance in different fields of application. | PLO.S2 |
| 6.1 | Develop practical programming skills for embedded systems, using languages such as C/C++. They must be able to design, develop and debug software suitable for embedded systems. | PLO.S6 |
| 7.1 | Acquire an in-depth knowledge of the different communication interfaces used in embedded systems, as well as commonly used protocols such as UART, SPI, I2C and wireless protocols. | PLO.S7 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| | Chapter 1: Introduction to Embedded Systems<br>• Definition of embedded systems and their importance<br>• Characteristics and constraints of embedded systems<br>• Examples of applications in different fields | 5 |
| | Chapter 2: Embedded Systems Architecture<br>• Hardware components and their role in embedded systems<br>• Advanced microprocessors and microcontrollers<br>• Memory and specific peripherals | 5 |
| | Chapter 3: Advanced Embedded Programming<br>• Low-level programming languages (C/C++) for embedded systems<br>• Optimized data structures and algorithms<br>• Using advanced development and debugging tools | 4.5 |
| | Chapter 4: Communication Interfaces and Protocols<br>• Serial communication interfaces (UART, SPI, I2C)<br>• Wireless communication protocols (Bluetooth, Wi-Fi, Zigbee)<br>• Industrial fieldbus (CAN, Modbus) | |
| | Chapter 5: Embedded Operating Systems<br>• Principles of Embedded Operating Systems<br>• Advanced real-time operating systems (RTOS)<br>• Scheduling and task management | 4 |
| | Chapter 6: Hardware Design and Optimization<br>• Design of complex printed circuit boards (PCBs)<br>• Simulation and modeling of electronic circuits<br>• Advanced component routing and placement techniques<br>• Techniques for optimizing performance and power consumption | |
| **Total** | | 22,5 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| | ✓ Understand the principles of embedded operating systems, with an emphasis on real-time systems. They must be able to manage tasks, scheduling and resource management in an embedded environment.<br>✓ Understand the architecture of embedded systems, including hardware components such as microprocessors, microcontrollers, memory, and peripherals, as well as associated programming logic and data structures. | ▪ Lecturing<br>▪ Practical work<br>▪ Class discussions | ▪ Reports<br>▪ Exercises and participation throughout the course<br>▪ Exams |
| **2.0** | **Skills** | | |
| | ✓ . Develop an in-depth knowledge of the basic concepts of embedded systems, including their definition, characteristics and importance in different fields of application. | ▪ Lecturing<br>▪ Practical work<br>▪ Class discussions | ▪ Reports<br>▪ Exercises and participation throughout the course<br>▪ Exams |
| | ✓ Develop practical programming skills for embedded systems, using languages such as C/C++. They must be able to design, develop and debug software suitable for embedded systems. | | |
| | ✓ Acquire an in-depth knowledge of the different communication interfaces used in embedded systems, as well as commonly used protocols such as UART, SPI, I2C and wireless protocols. | | |

### 2. Assessment Tasks for Students

| | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Monthly | 25 % |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **3** | First mid Term | 8 | 25% |
| **4** | Final Exam | 16 | 50 % |

## E. Student Academic Counselling and Support

| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:** |
|---|
| 1- Office hours<br>2- Blackboard interface |

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | 1-D.P. Kothari, K.V. Shiram, Sundaram. Embedded<br>2-Systems. V., Chunovkina A., Mironovsky L. Metrology and theory of measurement. De Gruyter, 2013 |
| **Essential References Materials** | PC<br>DATA-SHOW |
| **Electronic Materials** | Lecture material in PPT<br>Any Related material including the YouTube videos relating to engineering measurement<br>Blackboard |
| **Other Learning Materials** | NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| **Evaluation Areas/Issues** | **Evaluators** | **Evaluation Methods** |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

| | |
|---|---|
| Course Title: | **Computer Networks** |
| Course Code: | CSE422 |
| Program: | Master Degree In Computer Engineering |
| Department: | Computer Engineering |
| Course coordinator: | Dr. MOUNIR TELLI |
| Institution: | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

| |
|---|
| **1. Credit hours:** **2 (1-0-2)** |
| **2. Course type**<br>**a.** University ☐ College ☐ Department ☒ Others ☐<br>**b.** Required ☒ Elective ☐ |
| **3. Level/year at which this course is offered:** 2.2/3 |
| **4. Pre-requisites for this course :** CSE232, CSE341 |

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 33 | 78 |
| 2 | **Blended** | 45 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 22.5 |
| 2 | **Laboratory/Studio** | 22.5 |
| 3 | **Tutorial** | - |
| 4 | **Others** (specify) | - |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

### Course Description

This course provides an in-depth exploration of the world of computer networking, covering both fundamental theoretical concepts and the practical skills needed to design, configure and manage effective networks. Students will gain an in-depth understanding of network architecture, communications protocols, network security, and emerging technologies.

### Course Main Objectives

- ✓ Develop an in-depth understanding of fundamental computer networking concepts, including models, protocols and architectures.
- ✓ Learn to identify and formulate relevant research problems in the field of computer networks based on a critical analysis of existing literature.
- ✓ Learn to design and use visual aids such as slideshows, diagrams, and demonstrations to reinforce technical communication.
- ✓ Implement group projects to encourage collaboration within diverse teams, reflecting the reality of work environments.
- ✓ Develop analytical skills to evaluate the performance of computer systems and networks.
- ✓ Design and develop network applications using appropriate programming languages.

### 1. Course Learning Outcomes

| **CLOs** | | **Aligned PLOs** |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.2 | ✓ Develop an in-depth understanding of fundamental computer networking concepts, including models, protocols and architectures.<br>✓ Learn to identify and formulate relevant research problems in the field of computer networks based on a critical analysis of existing literature. | PLO.K.2 |
| **2** | **Skills** | |
| 2.2 | ✓ Learn to design and use visual aids such as slideshows, diagrams, and demonstrations to reinforce technical communication.<br>✓ Implement group projects to encourage collaboration within diverse teams, reflecting the reality of work environments. | PLOS2 |
| 2.3 | ✓ Develop analytical skills to evaluate the performance of computer systems and networks. | PLOS5 |
| 2.4 | ✓ Design and develop network applications using appropriate programming languages. | PLO.S7 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | **Chapter 1: Introduction to Computer Networks** | 3 |
| | ● Definition of computer networks<br>● Advantages and disadvantages of networks<br>● Network types (LAN, WAN, MAN) | |
| 2 | **Chapter 2: Network Components** | 3 |
| | ● Network hardware (routers, switches, hubs)<br>● Transmission media (cables, fiber optics, wireless)<br>● Interconnect devices (network cards, gateways) | |
| 3 | **Chapter 3: Network Models and Protocols** | **3** |
| | ● OSI model and TCP/IP model<br>● Main communication protocols (TCP, UDP, IP)<br>● Concepts of ports and sockets | |
| 4 | **Chapter 4: IP addressing** | 6 |
| | ● Binary system and conversion<br>● IP address classes<br>● Subnets and subnet masks<br>**Workshop 1 : Configuring a Local Network (LAN)**<br>● Set up a small local network with routers, switches and computers.<br>● Assign IP addresses, configure routing tables and DHCP settings. | |
| 5 | **Chapter 5: Routing and Switching** | 3 |
| | ● Static and dynamic routing<br>● Packet switching<br>● Routing and switching tables | |
| 6 | **Chapter 6: Transport Protocols** | **3** |
| | ● TCP (Transmission Control Protocol)<br>● UDP (User Datagram Protocol)<br>● Congestion management | |
| 7 | **Chapter 7: Network Security** | 6 |
| | ● Cryptography and encryption<br>● Firewalls and intrusion detection systems<br>● Authentication mechanisms<br>**Workshop 2 : Network Security and Inrusion test**<br>● Implementation of a firewall and an intrusion detection system.<br>● Configuring VPN to secure communications.<br>● Simulate attacks and test network resilience.<br>● Implement countermeasures to enhance security. | |

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| No | List of Topics | Contact Hours |
|---|---|---|
| | **Chapter 8: Network Services** | 6 |
| | ● DNS (Domain Name System)<br>● DHCP (Dynamic Host Configuration Protocol)<br>● HTTP/HTTPS (Hypertext Transfer Protocol)<br>**Workshop 3 : Configuring a DNS Server and Deploying a Web Server.**<br>● Install and configure a local DNS server.<br>● Set up forward and reverse search zones.<br>● Configure a web server (Apache, Nginx) on a local network.<br>● Create and host a simple web page. | |
| | **Chapter 9: Network Administration and Management** | |
| | ● Network Administration Tools<br>● Performance Monitoring<br>● Backup and recovery<br>**Workshop 4 : Use of Network Management tools.**<br>● Explore tools like Nagios for performance monitoring.<br>● Configure alerts in case of problems. | 6 |
| | **Chapter 10: New Trends in Networking** | |
| | ● cloud computing<br>● Software Defined Networks (SDN)<br>● IoT (Internet of Things)<br>**Workshop 5 : IoT integration.**<br>● Connect IoT devices to a network.<br>● Implement practical scenarios with sensors and actuators. | 6 |
| **Total** | | **45** |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| K.2 | ✓ Develop an in-depth understanding of fundamental computer networking concepts, including models, protocols and architectures.<br>✓ Learn to identify and formulate relevant research problems in the field of computer networks based on a critical analysis of existing literature. | - Lectures<br>- Class discussions<br>- Assignments | Assignments,<br>Quizzes,<br>Exams, |
| **2.0** | **Skills** | | |
| S.2 | ✓ Learn to design and use visual aids such as slideshows, diagrams, and demonstrations to reinforce technical communication.<br>✓ Implement group projects to encourage collaboration within diverse teams, reflecting the reality of work environments. | - Lectures<br>- Class discussions<br>- Assignments | Assignments,<br>Quizzes,<br>Exams,<br>Assignments,<br>Reports,<br>Quizzes,<br>Exams, |
| S.5 | ✓ Develop analytical skills to evaluate the performance of computer systems and networks. | | |
| S7 | ✓ Design and develop network applications using appropriate programming languages. | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 15% |
| **2** | Quizzes, Homework assignments | Random | 10% |
| **3** | MID-term | 8 | 25% |
| **4** | Final Exam | 16 | 50% |

## E. Student Academic Counseling and Support

**Arrangements for the availability of faculty and teaching staff for individual student consultations and academic advice :**

1- Office hours
2- Blackboard interface

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | 1. Mir, N.F. (2006) Computer and Communication Networks, Prentice Hall.<br>2. Networking All-in-One For Dummies (8th Edition) Doug Lowe (2021)<br>3. Computer networking : a top-down approach / James F. Kurose, Keith W. Ross.—8th ed (2022)<br>4. Computer Networking : Principles, Protocols and Practice/ Olivier Bonaventure, Universite catholique de Louvain(2011) |
| **Essential References Materials** | 1. " COMPUTER NETWORK", SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN.<br>2. CCNA 200-301 Official Cert Guide Library |
| **Electronic Materials** | • PPT<br>• YouTube videos<br>• PC<br>• DATA SHOW<br>• Blackboard |
| **Other Learning Materials** | NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| **Evaluation Areas/Issues** | **Evaluators** | **Evaluation Methods** |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

| | |
|---|---|
| **Course Title:** | **Database management systems** |
| **Course Code:** | CSE431 |
| **Program:** | Master Degree In Computer Engineering |
| **Department:** | Computer Engineering |
| **Course coordinator:** | Dr. THOURAYA GOUASMI |
| **Institution:** | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

**1. Credit hours:** **3 (1.5-0-1.5)**

**2. Course type**

**a.** University ☐ College ☐ Department ☒ Others ☐

**b.** Required ☒ Elective ☐

**3. Level/year at which this course is offered:** 2.2/3

**4. Pre-requisites for this course** (if any)**:** CSE131 and CSE321

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 33 | 78 |
| 2 | **Blended** | 45 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 22.5 |
| 2 | **Laboratory/Studio** | 22.5 |
| 3 | **Tutorial** | - |
| 4 | **Others** (specify) | - |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

**Course Description**

This course aims to discover the architecture of the Oracle DBMS and gives theoretical and practical basis on notions of the software administration of databases: DBA advanced objects (Sequences, Synonyms, Indexes, Views, Clusters, Snapshots), Transactions, data manipulation, administration tools and data access control (management of users, privileges and roles) based on two powerful languages SQL and PL/SQL.

**Course Main Objectives**

- ✓ Discover the architecture of the Oracle DBMS (memory structures, processes, storage structures) and administrate the database.
- ✓ Manipulate data with SQL (complex query)
- ✓ Acquire mastery of the PL/SQL language (basic concepts, functions, packages,.. )
- ✓ Create anonymous PL/SQL blocks, describes stored procedures and functions and Use sub-programs PL/SQL.
- ✓ Master the declaration of identifiers, cursors, and interception of exceptions and triggers.
- ✓ Effectively conclude soft database-related basics, principles, and manipulate with other disciplines.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | ✓ Discover the architecture of the Oracle DBMS (memory structures, processes, storage structures) and administrate the database. | PLO.K1 |
| 1.2 | ✓ Manipulate data with SQL (complex query) | |
| 1.3 | ✓ Acquire mastery of the PL/SQL language (basic concepts, functions, packages,.. ) | |
| **2** | **Skills** | |
| 2.1 | ✓ Create anonymous PL/SQL blocks, describes stored procedures and functions and Use sub-programs PL/SQL. | PLO.S2 |
| 2.2 | ✓ Master the declaration of identifiers, cursors, and interception of exceptions and triggers. | PLO.S7 |
| 2.3 | ✓ Effectively conclude soft database-related basics, principles, and manipulate with other disciplines. | |

## C. 1. Course Content

| **No** | **List of Topics** | **Contact Hours** |
|---|---|---|
| 1 | • Introduction and main concepts of databases and DBMS<br>• DBMS functional architecture | 3 |
| 2 | • Recall on SQL structured query language<br>• DBA advanced objects (Sequences, Synonyms, Indexes, Views, Clusters, Snapshots, etc) | 3 |
| 3 | Prior knowledge of PL/SQL (basics structures) and control structures | 3 |
| 4 | MidTerm-1 | 2 |
| 5 | Interaction with Oracle and explicit cursors<br>• Manipulate sub-programs<br>• Exception management in procedures and function<br>• Manage PL/SQL programs in packages | 7.5 |
| 6 | Triggers | 2 |
| 7 | Exam | 2 |
| **Total** | | 22.5 |

## C. 2. Practical Work Content

| **No** | **List of Topics** | **Contact Hours** |
|---|---|---|
| 1 | TP1 : Create a database and manipulate data<br>• Creating and modifying the structure of a database<br>• Manipulating data in a database (INSERT, DELETE, UPDATE) | 3 |
| 2 | TP2 : Interrogate a database<br>• Projections and simple restrictions<br>• Aggregate computation<br>• Complex restrictions and joins<br>• Embedded queries<br>• Clustering | 4 |
| 3 | TP3: PL/SQL Language elements (Blocks, variable, control structure)<br>• Blocks<br>• Variables<br>• Conditional and iterative control structures<br>• Complex types | 4 |
| 4 | TP4: Cursors<br>• Implicit cursor<br>• Explicit cursor | 3 |
| 5 | TP5: Stored procedures and functions and Exceptions | 2.5 |
| 6 | TP6: Triggers | 3 |
| 7 | Practical Exam | 3 |
| **Total** | | 22.5 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| PLO.K1 | Discover the architecture of the Oracle DBMS (memory structures, processes, storage structures) and administrate the database. | Lecturing | Assignments,<br>Quizzes ,<br>Exams, |
| | Manipulate data with SQL (complex query). | | |
| | Acquire mastery of the PL/SQL language (basic concepts, functions, packages,… ). | | |
| **2.0** | **Skills** | | |
| PLO.S2 | Create anonymous PL/SQL blocks, describes stored procedures and functions and Use sub-programs PL/SQL. | Lecturing/ Lab demonstration | Assignments,<br>Quizzes ,<br>Exams, |
| PLO.S7 | Master the declaration of identifiers, cursors, and interception of exceptions and triggers. | | |
| | Effectively conclude soft database-related basics, principles, and manipulate with other disciplines. | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 15% |
| **2** | Quizzes, Homework assignments | Random | 10% |
| **3** | First mid Term | 8 | 25% |
| **5** | Final Exam | 16 | 50% |

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

1- Office hours
2- Blackboard interface

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | 1. Pierre Stockreiser, database management systems, dec 2006<br>2. Maude Manouvrier, Relational Database Management Systems (DBMS)<br>3. M.T.Öszu, P. Valduriez : Principles of Distributed Database Systems, 2nd edition, Prentice Hall, 1999.<br>4. R. Ramakrishnan: Database Management Systems, Mc-Graw Hill, 1997<br>5.Jérôme GABILLAUD. « Oracle 10g SQL, PL/SQL, SQL*Plus. 2005». Editions EN<br>6. H. Garcia-Molina, J.D.Ullman, J. Widom : Database System Implementation, Prentice Hall, 2000<br>7. Mohamed Fadhel SAAD: PL/SQL sous Oracle 12cGuide du DÉVELOPPEUR, EDITIONS eni 2016. |
| **Essential References Materials** | **1**. https://docs.oracle.com/cd/B10501_01/appdev.920/a96624/toc.htm<br>**2**. https://oracle.developpez.com/cours/#SQL-et-PL-SQL<br>**3**. http://www.oracle.com/technetwork/database/database-technologies/expressexpressedition/downloads/index.html 4. http://www.oracle.com/technetwork/developer-tools/sqldeveloper/downloads/index.html<br>**5**. https://www.oracle.com/fr/database/systeme-gestion-base-de-donnees-sgbd-definition.html |
| **Electronic Materials** | ● Lecture material in PPT<br>● Any Related material including the YouTube videos relating to engineering measurement<br>● Blackboard |
| **Other Learning Materials** | NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

**Tunisian Republic**
**Private Higher School of Engineers of Gafsa**
**Private Higher Education Institution,**
**State-approved under N° 05-2013**

| | |
|---|---|
| **Course Title:** | **Artificial intelligence** |
| **Course Code:** | CSE432 |
| **Program:** | Master Degree In Computer Engineering |
| **Department:** | Computer Engineering |
| **Course coordinator:** | Dr. Naziha DHIBI |
| **Institution:** | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

1. **Credit hours:** **3 (1.5-1.5-0)**

**2. Course type**

**a.** College ☐ Department ■ Others ☐

**b.** Fundamental ■ Transversal ☐ Optional ☐ ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course (if any):** Math Basics - Python Programming Basic, Formal logic.

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 16.5 | 39 |
| 2 | **Blended** | 22.5 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 12.5 |
| 2 | **Laboratory/Studio** | …… |
| 3 | **Tutorial** | 10 |
| 4 | **Others** (specify) | …… |
| | **Total** | 22.5 |

## B. Course Objectives and Learning Outcomes

### Course Description

The "Artificial Intelligence" course covers the basic notions and concepts of artificial intelligence, learning paradigm, Supervised learning, Reinforcement learning, Unsupervised learning and Machine learning: (Multi Layer Perceptron)

### Course Main Objective

- ✓ Acquire prior knowledge of artificial intelligence.
- ✓ Understand the supervised machine learning algorithms (k-Nearest Neighbors, Linear Models, Adaboost algorithm, Decision Trees, …)
- ✓ Master supervised learning (Classification and regression) and Unsupervised Learning (preprocessing and scaling, clustering, ...)
- ✓ Build, train and evaluate a neural network classifier (Multi Layer Perceptron: MLP).
- ✓ Study the Model Evaluation and Improvement.
- ✓ Analyze, Design and develop software related to artificial intelligence, with taking in consideration its static, dynamic and ergonomic aspects with recognition and respect of planning issues.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and understanding** | |
| 1.1 | ✓ Acquire prior knowledge of artificial intelligence. | PLO.K1 |
| 1.2 | ✓ Understand the supervised machine learning algorithms (k-Nearest Neighbors, Linear Models, Naive Bayes Classifiers, Decision Trees, …) | |
| 1.3 | ✓ Study the Model Evaluation and Improvement. | |
| **2** | **Skills** | |
| 2.1 | ✓ Master supervised learning (Classification and regression) and Unsupervised Learning (preprocessing and scaling, clustering, ...) | PLO.S2 |
| 7.1 | ✓ Build, train and evaluate a neural network classifier (Multi Layer Perceptron: MLP). | PLO.S7 |
| 7.2 | ✓ Analyze, Design and develop software related to artificial intelligence, with taking in consideration its static, dynamic and ergonomic aspects with recognition and respect of planning issues. | |

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## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Intelligence artificiel history and machine Learning | 1 |
| 2 | Supervised Learning: Classification and Regression | 1.5 |
| 3 | Unsupervised Learning and data clustering | 1.5 |
| 4 | Comparing and Evaluating Clustering Algorithms | 1.5 |
| 5 | Supervised Machine Learning Algorithms:MLP | 3 |
| 9 | MidTerm | 2 |
| **Total** | | 8.5 |

## C.2 Tutorial work Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Supervised Learning: Linear and Logistic Regression Model | 3 |
| 2 | Supervised Learning: Decision Tree | 3 |
| 3 | Supervised learning: Adaboost algorithm | 2 |
| 4 | Machine learning: The Support Vector Machine and K-Nearest Neighbors algorithms. | 3 |
| 5 | Neural network classifier: (Multi Layer Perceptron: MLP) | 3 |
| **Total** | | 14 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| PLO.K1 | ✓ Acquire prior knowledge of artificial intelligence.<br>✓ Understand the supervised machine learning algorithms (k-Nearest Neighbors, Linear Models, Naive Bayes Classifiers, Decision Trees, …)<br>✓ Study the Model Evaluation and Improvement. | ● Lecturing<br>● Tutorial<br>● Problem-Based Learning<br>● Project-Based Learning | Assignments, Homework Quizzes , Exams, |
| **2.0** | **Skills** | | |
| PLO.S2 | ✓ Master supervised learning (Classification and regression) and Unsupervised Learning (preprocessing and scaling, clustering, ...)<br>✓ Build, train and evaluate a neural network classifier (Multi Layer Perceptron: MLP). | ● Lecturing<br>● Tutorial<br>● Problem-Based Learning<br>● Project-Based Learning | Assignments, Homework Quizzes , Exams, Report, |
| PLO.S7 | ✓ Analyze, Design and develop software related to artificial intelligence, with taking in consideration its static, dynamic and ergonomic aspects with recognition and respect of planning issues.. | | |

### 2. Assessment Tasks for Students

| | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 00% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **5** | Final Exam | 16 | 100% |

## E. Student Academic Counselling and Support

| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :** |
|---|
| 1- Office hours<br>2- Blackboard interface |

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | www.finelybook.com |
| **Essential References Materials** | 1. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn & TensorFlow, Concepts tools and techniques to build intelligent systems<br>2. Andreas C. Müller & Sarah Guido, Introduction to Machine Learning with Python<br>3. Chris Albon, Python Machine Learning Cookbook |
| **Electronic Materials** | ● Lecture material in PPT<br>● Any Related material including the YouTube videos relating to engineering measurement<br>Blackboard |
| **Other Learning Materials** | NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| **Evaluation Areas/Issues** | **Evaluators** | **Evaluation Methods** |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

**Tunisian Republic**
**Private Higher School of Engineers of Gafsa**
**Private Higher Education Institution,**
**State-approved under N° 05-2013**

| | |
|---|---|
| **Course Title:** | **English IV: TOEIC B2,2 Certification** |
| **Course Code:** | LAC441 |
| **Program:** | Master Degree In Computer Engineering |
| **Department:** | Computer Engineering |
| **Course coordinator:** | Dr. RADDADI RIM |
| **Institution:** | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

1. **Credit hours:** **1.5 (1.5-0-0)**

**2. Course type**

**a.** College ☐ Department ☒ Others ☐

**b.** Fundamental ☒ Transversal ☐ Optional ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course (if any):** LAC151, LAC251, LAC351

5. **Co-requisites for this course** (if any)**:** None

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 16.5 | 39 |
| 2 | **Blended** | 22.5 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 22.5 |
| 2 | **Laboratory/Studio** | - |
| 3 | **Tutorial** | - |
| 4 | **Others** (specify) | - |
| | **Total** | 22.5 |

## B. Course Objectives and Learning Outcomes

**Course Description**

This course deals with the most widespread English proficiency exam that tests business English skills.

Topics of this course are related to business English and computer science. They are meticulously selected among the most used themes in the TOEIC test.

This course would give an insight of the TOEIC test and give tips that would help managing the time of the exam.

Grammatical points and vocabulary are taught in context.

This course is student centred and incorporates the 21st century skills in the ELT (English Language Teaching) classrooms, hence, creativity, collaboration, critical thinking, and communication are crucial components of the learning process.

**Course Main Objective**

- listen for general information and listening for details
- Reading for general information and reading for details
- Demonstrate an advanced understanding of computer science engineering principles
- Analyse graphics, visuals, tables, and diagrams orally or transfer them into a written text.

### 3. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Demonstrate an advanced understanding of computer science engineering principles | PLO K.1 |
| **2** | **Skills** | |
| 2.1 | Analyse graphics, visuals, tables, and diagrams orally or transfer them into a written text. | PLO. S1 |
| 2.2 | Analyse different types of writing documents in English | PLO S.5 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1<br>Conversation | Identifying time, people, and content<br>Identifying topic, reason, and location<br>Identifying opinion, word stress and tone.<br>Strategy practice | 6 |
| 2<br>talks | Identifying the sequence and the audience<br>Identifying the situation and the topic<br>Identifying a request<br>Strategy review<br>Strategy practice | 6 |
| 3<br>Reading comprehension | Reading strategies | 1.5 |
| 4<br>Reading practice | Advertisements<br>Business correspondence<br>Forms, charts, and graphs<br>Articles and reports<br>Announcements and paragraph | 7 |
| 5<br>End of term exam | | 2 |
| **Total** | | 22.5 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| K.1 | Demonstrate an advanced understanding of computer science engineering principles | -Pair or groupe work.<br>- Activities<br>- Games. | Assignments.<br>Peer to peer evaluation. |
| **2.0** | **Skills** | | |
| S.2 | Analyse graphics, visuals, tables, and diagrams orally or transfer them into a written text. | TBL | Assignment<br>Peer to peer evaluation. |

### 2. Assessment Tasks for Students

| | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 00% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **5** | Final Exam | 16 | 100% |

## E. Student Academic Counselling and Support

| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:** |
|---|
| - Office hours<br>- Blackboard interface<br>- Academic advisor<br>- Bibliotic |

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | |
| **Essential References Materials** | |
| **Electronic Materials** | |
| **Other Learning Materials** | - NA |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation**<br>(Classrooms, laboratories, demonstration rooms/labs, etc.) | **classroom board software …** |
| **Technology Resources**<br>(AV, data show, Smart Board, software, etc.) | **data show;** |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

| | |
|---|---|
| Course Title: | **French IV: Communication technique and preparation for Delf Pro 2** |
| Course Code: | LAC442 |
| Program: | Master Degree In Computer Engineering |
| Department: | Computer Engineering |
| Course coordinator: | Mrs. AMEUR NOUREDDINE |
| Institution: | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

**1. Credit hours:** **1.5 (1.5-0-0)**

**2. Course type**

**a.** College ☐ Department ■ Others ☐

**b.** Fundamental ■ Transversal ☐ Optional ☐

**3. Level/year at which this course is offered:** 2.2/3

**4. Pre-requisites for this course (if any):** LAC152, LAC252, LAC3352

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 16.5 | 39 |
| 2 | **Blended** | 22.5 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 10 |
| 2 | **Laboratory/Studio** | 12,5 |
| 3 | **Tutorial** | - |
| 4 | **Others** (specify) | - |
| | **Total** | 22,5 |

## B. Course Objectives and Learning Outcomes

## Course Description

This "Communication" course gives a clear vision of the French language of the professional type with its different articulations according to the situations of the communication itself.
The student should be able to:

- ✓ Acquire knowledge of organizational communication.
- ✓ Express themselves correctly in terms of written language and in the context of professional documents (letters, minutes of meetings, notes, press reviews, etc.)
- ✓ To present oneself in an internship or job interview on the basis of a good application file and a real psycholinguistic preparation.
- ✓ To obtain the necessary skills to really enter professional life.

## Course Main Objective

- ✓ Acquire knowledge of organizational communication.
- ✓ To express oneself orally before an audience or a small group, in terms of expression as such, gestures, attitudes and mastery of the material assigned to it.
- ✓ Express oneself correctly in terms of written language and in the context of professional documents (letters, minutes of meetings, notes, files, press reviews, etc.), which presupposes an adequate command of the French language itself and of certain computer tools.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Express themselves correctly in terms of written language and in the context of professional documents (letters, minutes of meetings, notes, press reviews, etc.) | PLO K.1 |
| | To present oneself in an internship or job interview on the basis of a good application file and a real psycholinguistic preparation. | PLO K.2 |
| **2** | **Skills** | |
| 2.2 | To express oneself orally before an audience or a small group, in terms of expression as such, gestures, attitudes and mastery of the material assigned to it. | PLO S.2 |
| | Express oneself correctly in terms of written language and in the context of professional documents (letters, minutes of meetings, notes, files, press reviews, etc.), which presupposes an adequate command of the French language itself and of certain computer tools. | PLOS.6 |
| | Acquire knowledge of organizational communication | PLOS.7 |
| **3** | **Values** | |
| 3.1 | -Acquire the necessary skills to enter professional life.<br>-Conducting a meeting: preparation, moderation, participation, evaluation of a meeting, conflict management, decision making. | V.4 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Presentation of the course and level test through a discussion topic. | 2 |
| 2 | Fundamental concepts of communication (Process, means, functions and obstacles...) | 2,5 |
| 3 | Techniques of modern professional communication (supporting text) | 3 |
| 4 | Professional writing (report, minutes, note, summary, cover letter, CV...) | 3 |
| 5 | How to write a cover letter and a professional CV | 2,5 |
| 6 | Speaking (oral presentations...) and conducting meetings (preparation, evaluation and conflict management...) | 3,5 |
| 7 | Audio-visual session: videos to watch and comment on (Job interview, how to write a good CV, a covering letter, producing a professional e-mail...) | 3,5 |
| 8 | Pre-examination debriefing | 1 |
| 9 | Main review | 1,5 |
| **Total** | | 22,5 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| K.1<br>K.1 | Knowledge of organisational communication<br>Fundamental concepts of communication: awareness of the complex process of communication, identification of the means of communication, the functions of speech, the obstacles to communication. | Lecturing, speaking & writing | Assignments, Quizzes, Exams, |
| **2.0** | **Skills** | | |
| S.2 | Expressing oneself correctly in terms of written language and in the context of professional documents (letters, minutes of meetings, notes, files, press reviews, etc.), which presupposes an adequate command of the French language itself and of certain computer tools. | Lecturing<br>Tutorials<br>Courses<br>project | Assignments, Quizzes, Exams, |
| S.2 | Professional writing: writing an agenda, a memo, a summons, letters, reports, minutes, etc. | | Assignments, Report, Quizzes, Exams, |
| **3.0** | **Values** | | |
| V.4 | Acquire the necessary skills to enter professional life. | - Lectures<br>- Class discussions<br>- Assignments<br>- projects | Assignments, Report, Quizzes, Exams |
| V.4 | Conducting a meeting: preparation, moderation, participation, evaluation of a meeting, conflict management, decision making. | | Assignments, Report, Quizzes, Exams |

### 2. Assessment Tasks for Students

| | **Assessment task*** | **Week Due** | **Percentage of Total Assessment Score** |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 00% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **5** | Final Exam | 16 | 100% |

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | - Jérôme Koechlin, "La communication professionnelle: les clés pour réussir"("Professional communication: the keys to success"), Paris : Edition PPUR 2015(1ère edition).<br>- Michel Danilo, Lincoln, Jean-Luc Penfornis, "Le français de la communication professionnelle"( "French for professional communication"), Allemagne : Edition Cle International (collection Le français de) 1993. |
| **Essential References Materials** | - Electronic references:<br>- https://www.podbean.com/podcast-detail/hvdrf-37d03/Learn-French-with-French-Podcasts---Fran%C3%A7ais-avec-Pierre<br>- https://www.printbasprix.com/blog/quest-ce-que-communication-professionnelle/<br>- https://www.reussirmavie.net/Comment-preparer-son-entretien-d-embauche_a118.html |
| **Electronic Materials** | - Lecture material in Word & PDF…<br>- Any Related material including the YouTube videos relating to Communication French. |
| **Other Learning Materials** | - NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software** |

| **Item** | **Resources** |
|---|---|
| **Technology Resources** | **Internet access** |
|  | **Data projector** |

## G. Course Quality Evaluation

| **Evaluation Areas/Issues** | **Evaluators** | **Evaluation Methods** |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

|  |  |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

| | |
|---|---|
| Course Title: | **Business creation and systems management** |
| Course Code: | LAC443 |
| Program: | Master Degree In Computer Engineering |
| Department: | Computer Engineering |
| Course coordinator: | Ms. Safaa ELGHEAIB |
| Institution: | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

1. **Credit hours:** **3 (1.5-1.5-0)**

2. **Course type**

**a.** University ■ College ☐ Department ■ Others ☐

**b.** Required ■ Elective ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course** (if any):

5. **Co-requisites for this course** (if any):

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 16.5 | 39 |
| 2 | **Blended** | 22.5 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 15 |
| 2 | **Laboratory/Studio** | |
| 3 | **Tutorial** | 7.5 |
| 4 | **Others** (specify) | - |
| | **Total** | 22.5 |

## B. Course Objectives and Learning Outcomes

### Course Description

The course covers the basic knowledge related to entrepreneurship and the Business Plan.

The creation of a company and management of system is a state of mind, an intellectual value the course aims to give the different types of companies and their management systems in order to detect students with an entrepreneurial spirit.

This course represents a brief introduction to business creation. It describes the main characteristics of the management system and seeks to explain them. Also, to understand the business creation process from idea to the start of the business and the role of the contractor in each stage.

A management system is a key tool in helping to streamline the business processes and build-in efficiency. Implementation of the appropriate management system and certifying to the appropriate standard to your business improves business performance and embeds safe and sustainable practices into the operations.

The success of a business creation project requires the prior development of a complete market study. It will allow the bearer to assess the market potential in order to validate the viability of his project and then to adopt a relevant competitive positioning.

### Course Main Objective

- ✓ Introduction to the concepts of a company, entrepreneur, entrepreneurship, business, a management system…
- ✓ Present the business
- ✓ Describe the dimensions of the company,
- ✓ Explain the main functions of the company,
- ✓ Define the business environment,
- ✓ Describe the current characteristics of the environment,
- ✓ Explain the relationship of the company with its environment.
- ✓ Describe the competencies of managers.
- ✓ Master the Business Management System (BMS).
- ✓ Understand the business creation process.
- ✓ Mastering the process from the idea to the project: have an idea, assess the opportunity, Business Plan, financial forecasts.
- ✓ Learn how to list the resources and the quantities needed for each step in the system.
- ✓ Define its positioning: define your market, segmentation, prioritize segments, marketing and sales plan.
- ✓ Mastery of the commercial and competitive environment.
- ✓ Develop the market study, the financial (apply financial indicators) and technical study.
- ✓ Master the structure and mode of operation: structure and organization, Business model, legal and financial aspects.
- ✓ Master the process from analysis to a successful start: risk identification and management, business creation market.
- ✓ Apply basics, principles, and theories to identify, formulate, and solve complex system management and creation business process.

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### 1. Course Learning Outcomes

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| | ✓ Introduction to the concepts of a company, entrepreneur, entrepreneurship, business, a management system…<br>✓ Present the business<br>✓ Describe the dimensions of the company, | PLO.K1 |
| | ✓ Describe the current characteristics of the environment,<br>✓ Explain the relationship of the company with its environment.<br>✓ Describe the competencies of managers.<br>✓ Master the Business Management System (BMS).<br>✓ Understand the business creation process. | PLO.K2 |
| **2** | **Skills** | |
| | ✓ Mastering the process from the idea to the project: have an idea, assess the opportunity, Business Plan, financial forecasts.<br>✓ Learn how to list the resources and the quantities needed for each step in the system | PLO.S2 |
| | ✓ Master the structure and mode of operation: structure and organization, Business model, legal and financial aspects.<br>✓ Master the process from analysis to a successful start: risk identification and management, business creation market. | PLO.S5 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| **1** | **Chapter 1: the company (business)**<br>1. Present the business<br>2. Describe the dimensions of the company,<br>3. Explain the main functions of the company,<br>4. Define the business environment,<br>5. Describe the current characteristics of the environment,<br>6. Explain the relationship of the company with its environment.<br>7. Describe the competencies of managers. | 4.5 |
| **2** | **Chapter 2: From idea to project**<br>1. Have an idea<br>2. Assess the opportunity<br>3. The Business Plan<br>4. Financial forecasts | 4.5 |
| **3** | **Chapter 3: Define your position**<br>1. Define your market<br>2. Segmentation<br>3. Prioritize segments<br>4. The marketing and sales plan | 4.5 |
| **4** | **Chapter 4: Structure and mode of operation**<br>1. Structure and organization<br>2. Business model<br>3. Legal and financial aspects | 4.5 |
| **5** | **Chapter 5: From analysis to a successful start** | 4.5 |

| No | List of Topics | Contact Hours |
|---|---|---|
| | 1. Risk identification and management<br>2. The business creation market | |
| **Total** | | 22.5 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| K.1 | ✓ Introduction to the concepts of a company, entrepreneur, entrepreneurship, business, a management system…<br>✓ Present the business<br>✓ Describe the dimensions of the company, | Lecturing | Assignments, Quizzes , Exams, |
| **2.0** | **Skills** | | |
| PLO.S2 | ✓ Mastering the process from the idea to the project: have an idea, assess the opportunity, Business Plan, financial forecasts.<br>✓ Learn how to list the resources and the quantities needed for each step in the system | Debate, whole group and small group work, discussion and research activities, lab demonstrations, projects, role playing, individuel | Course project report & presentation<br>Written exams<br>homework<br>Lab work |
| PLO.S7 | ✓ Master the structure and mode of operation: structure and organization, Business model, legal and financial aspects.<br>✓ Master the process from analysis to a successful start: risk identification and management, business creation market. | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 00% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **3** | First mid Term | 8 | 00% |
| **5** | Final Exam | 16 | 100% |

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

## F. Learning Resources and Facilities

### 2. 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | « La Gestion Stratégique d'Entreprises» M. COTE, édition G.MORIN, 1995. |
| **Essential References Materials** | - « Organisation et Gestion de l'Entreprise » édition NATHAN , 1997.<br>- Feuer, Louis. "Business management." Case Manager 6, no. 5 (October 1995)<br>- Dodds, J. Colin. "Business management." British Accounting Review 23, no. 3 (September 1991)<br>- Hamel, Sherdon. "Strategic business plan: Senior Planning Solutions." CSUSB ScholarWorks, 2001<br>- Thierry Burger-Helmchen, Sophie Raedersdorf, (2018), "Le plan d'affaires", Dans Pro en Management. |
| **Electronic Materials** | - Lecture material in PPT (DATA SHOW).<br>- Any Related material including the YouTube videos relating to business management and system management.<br>- Blackboard |
| **Other Learning Materials** | NA |

### 3. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

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## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

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| | |
|---|---|
| Course Title: | **Functional programming** |
| Course Code: | CSE451/1 |
| Program: | Master Degree In Computer Engineering |
| Department: | Computer Engineering |
| Course coordinator: | Dr. Mohamed Fadhel SAAD |
| Institution: | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

| |
|---|
| **1. Credit hours: 3 (1.5-0-1.5)** |
| **2. Course type**<br>**a.** College ☐ Department ■ Others ☐<br>**b.** Fundamental ■ Transversal ☐ Optional ☐ |
| **3. Level/year at which this course is offered:** 2.2/3 |
| **4. Pre-requisites for this course (if any):** CSE131, CSE132 |
| **5. Co-requisites for this course** (if any)**:** |

1. **Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 33 | 78 |
| 2 | **Blended** | 45 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

2. **Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 22.5 |
| 2 | **Laboratory/Studio** | 22.5 |
| 3 | **Tutorial** | - |
| 4 | **Others** (specify) | - |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

**Course Description**

The Functional Programming in Python course aims to help students become programmers capable of designing, implementing, and maintaining efficient and elegant functional programs in Python.

**Course Main Objective**

- Understand basic functional programming concepts and principles, such as higher-order functions, lambda expressions, recursion, function composition, and more.
- Understand how functional programming differs from other programming paradigms, such as imperative programming and object-oriented programming.
- Learn to use functional programming tools in Python, such as map, filter, and reduce functions, lambda expression syntax, generators, and list comprehensions.
- Learn how to create functional programs in Python, using techniques such as pure functional programming, data immutability, and recursion.
- Understand how functional programming can improve the readability, maintainability, and performance of Python code.
- Discover how functional programming can be used in applications such as data manipulation, signal processing, machine learning, and numerical analysis.
- Gain hands-on experience programming real-world examples in Python, such as creating programs to manipulate lists, arrays, and other data structures, as well as sample applications such as data analysis and machine learning.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| | **Knowledge and Understanding** | |
| 1.2 | - Understand basic functional programming concepts and principles, such as higher-order functions, lambda expressions, recursion, function composition, and more. | PLO.K1 |
| 1.2 | - Understand how functional programming differs from other programming paradigms, such as imperative programming and object-oriented programming. | |
| 1.3 | - Learn to use functional programming tools in Python, such as map, filter, and reduce functions, lambda expression syntax, generators, and list comprehensions. | |
| 1.4 | - Learn how to create functional programs in Python, using techniques such as pure functional programming, data immutability, and recursion. | |
| 1.5 | - Understand how functional programming can improve the readability, maintainability, and performance of Python code. | |
| | **SKILLS** | |
| 1.1 | Gain hands-on experience programming real-world examples in Python, such as creating programs to manipulate lists, arrays, and other data structures, as well as sample applications such as data analysis and machine learning. | PLO.S1 |
| 7.1 | Promote effective collaboration and communication among multidisciplinary teams to achieve software design and development objectives through function programing. | PLO.S7 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | ❖ Introduction to Functional Programming in Python<br>- Definitions and basic principles<br>- Comparison with other programming paradigms<br>- Advantages and Disadvantages of Functional Programming in Python | 3 |
| 2 | ❖ Functions<br>- Functions as values<br>- Higher Order Functions<br>- Recursive functions<br>- Lambda Expressions<br>- Partial functions | 6 |
| 3 | ❖ Immutable data types<br>- Character strings | 6 |

| | | |
|---|---|---|
| | - Tuples<br>- Sets<br>- Immutable Dictionaries | |
| 4 | ❖ Lists in Python<br>- Lists as sequences<br>- Manipulating Lists with Map, Filter, and Reduce Functions<br>- List comprehensions and generator expressions<br>- List reduction with lambda functions | 6 |
| 5 | ❖ Higher order functions<br>- Introduction to Higher Order Functions<br>- Using Higher Order Functions as Arguments and Results<br>- Practical Examples of Using Higher Order Functions in Python | 6 |
| 6 | ❖ Advanced recursive functions<br>- Analysis of more complex problems solved by recursive functions<br>- Using advanced techniques like memoization and tail recursion | 6 |
| 7 | ❖ Manipulation of data streams<br>- Introduction to Data Flows<br>- Using data flow manipulation functions (map, filter, reduce)<br>- Practical Examples of Using Data Flow Manipulation in Python | 6 |
| 8 | ❖ Practical applications of functional programming<br>- Examination of real use cases of functional programming<br>- Completion of a hands-on project implementing the concepts and techniques learned | 6 |
| **Total** | | 45 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| **Code** | **Course Learning Outcomes** | **Teaching Strategies** | **Assessment Methods** |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| | - Understand basic functional programming concepts and principles, such as higher-order functions, lambda expressions, recursion, function composition, and more.<br>✓ Understand how functional programming differs from other programming paradigms, such as imperative programming and object-oriented programming. | Lecturing | Assignments, Quizzes, Exams, |

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| | ✓ Learn to use functional programming tools in Python, such as map, filter, and reduce functions, lambda expression syntax, generators, and list comprehensions.<br>✓ Learn how to create functional programs in Python, using techniques such as pure functional programming, data immutability, and recursion.<br>✓ Understand how functional programming can improve the readability, maintainability, and performance of Python code.<br>✓ Discover how functional programming can be used in applications such as data manipulation, signal processing, machine learning, and numerical analysis. | | |
| **3.0** | **Skills** | | |
| PLO.S1 | ✓ Gain hands-on experience programming real-world examples in Python, such as creating programs to manipulate lists, arrays, and other data structures, as well as sample applications such as data analysis and machine learning | - Lectures<br>- Class discussions<br>- Assignments<br>- projects | Assignments, Report, Quizzes, Exams |
| PLO.S7 | ✓ Promote effective collaboration and communication among multidisciplinary teams to achieve software design and development objectives through function programing. | | |

## 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 25% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **3** | First mid Term | 8 | 25% |
| **4** | Final Exam | 16 | 50% |

## E. Student Academic Counselling and Support

| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:** |
|---|
| - Office hours<br>- Blackboard interface<br>- Academic advisor<br>- Bibliotic |

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | - Functional Programming in Python, David Mertz, May 2015, O'Reilly Media, Inc. |
| **Essential References Materials** | - Functional Python Programming, Steven F. Lott, April 2018, Packt.<br>- Python for Data Analysis, by William McKinney, November 2017, O'Reilly Media, Inc.<br>- Python Cookbook, 3rd Edition, David Beazley, Brian K. Jones, Released May 2013, O'Reilly Media, Inc. |
| **Electronic Materials** | - Lecture material in PPT<br>- Any Related material including the YouTube videos relating to engineering measurement<br>- Blackboard |
| **Other Learning Materials** | - NA |

### 2. Facilities Required

| **Item** | **Resources** |
|---|---|
| **Accommodation** | **Classroom board**<br>**Computer lab with the necessary software**<br>**Internet access** |
| **Technology Resources** | **Data projector** |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment. | Students, course coordinator, Alumni, Employers | Direct/Indirect |
| Extent of achievement of course learning outcomes. | Faculty, Program Leaders, quality department | Direct |
| Quality of Learning resources | Faculty, Program Leaders, | Direct, Indirect |
| Teaching and learning quality and effectiveness. | Students, Faculty Program Leaders, | Direct, Indirect |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |

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Privée de Gafsa

**Tunisian Republic**
**Private Higher School of Engineers of Gafsa**
**Private Higher Education Institution,**
**State-approved under N° 05-2013**

| | |
|---|---|
| **Course Title:** | **Software Architecture** |
| **Course Code:** | CSE452/1 |
| **Program:** | Computer science Engineering |
| **Department:** | Computer Engineering |
| **Course coordinator:** | Dr. Rim Afdhal |
| **Institution:** | Private Higher School of Engineers of Gafsa (ESIP) |

## A. Course Identification

1. **Credit hours:** **3 (1.5-0-1.5)**

**2. Course type**

**a.** College ☐ Department ☒ Others ☐

**b.** Fundamental ☒ Transversal ☐ Optional ☐

3. **Level/year at which this course is offered:** 2.2/3

4. **Pre-requisites for this course (if any): Object-oriented design, Data structures, Data base, Programming languages**

### 1. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Self-study | Total workload |
|---|---|---|---|---|
| 1 | **Traditional classroom** | ….. | 33 | 78 |
| 2 | **Blended** | 45 | | |
| 3 | **E-learning** | …… | | |
| 4 | **Distance learning** | …… | | |
| 5 | **Other ()** | …… | | |

### 2. Contact Hours (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 22.5 |
| 2 | **Laboratory/Studio** | 22.5 |
| 3 | **Tutorial** | - |
| 4 | **Others** (specify) | - |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

**Course Description**

This course covers the positioning and the typology of software architecture, the modeled software architecture, the architectural styles, the documentation of software architectures, the ADL, and the hibernate framework.

**Course Main Objective**

- ✓ Introduce the software architecture: positioning, principles, paradigms, and typology.
- ✓ Define the modeling styles.
- ✓ Explain the architectural styles.
- ✓ Define Data-centric approach.
- ✓ Manage the design problems and ethics related to software architecture.
- ✓ Design, conduct, analyze, and evaluate practices, projects, and experiments related to software architecture issues.
- ✓ Master the physical and logical architectural styles.

### 1. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| | **Knowledge and Understanding** | |
| 2.1 | Introduce the software architecture: positioning, principles, paradigms, and typology. | PLO.K2 |
| 2.2 | Define the modeling styles. | |
| 2.3 | Define Data-centric approach. | |
| 3.1 | Explain the architectural styles. | PLO.K3 |
| | **Skills** | |
| 2.2 | Master the physical and logical architectural styles. | PLO.S2 |
| 2.4 | Design, conduct, analyze, and evaluate practices, projects, and experiments related to software architecture issues. | PLO.S4 |
| 2.5 | Manage the design problems and ethics related to software architecture. | PLO.S5 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Introduction to the software architecture: positioning, principles, paradigms, and typology of software architectures. | 2 |
| 2 | Representation of software architectures: modeling styles | 2 |
| 3 | The 1+4 view model (semi-formal), The trilogy model (formal) | 2 |
| 4 | Representation of Software Architecture with UML | 3 |
| 5 | Architectural styles | 3 |
| 6 | Physical and logical architectural styles | 2 |
| 7 | Data-centric approach | 2 |
| 8 | MVC architecture | 2 |
| 9 | Documentation of ADL software architectures | 3 |
| 10 | ADL types, wright, Darwin | 3 |
| 11 | The persistence management | 2 |
| 12 | Architecture with persistence | 2 |
| 13 | Component-based architecture | 2 |
| **Total** | | 30 |

## C .1 Practical work Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Diagrams of packages and components | 2 |
| 2 | Diagrams of deployments and sequences | 2 |
| 3 | Architectural styles | 3 |
| 4 | 1-tier data-centric architecture | 3 |
| 5 | ADL wright | 3 |
| 6 | ADL Darwin | 2 |
| **Total** | | 15 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| PLO.K2 | Introduce the software architecture: positioning, principles, paradigms, and typology.<br>Define the modeling styles.<br>Define Data-centric approach. | Lecturing | Assignments, Quizzes , Exams, |
| PLO.K3 | Explain the architectural styles. | | |
| **2.0** | Skills | | |
| PLO.S2 | Master the physical and logical architectural styles. | Lecturing | Assignments, Quizzes , Exams, |
| PLO.S4 | Design, conduct, analyze, and evaluate practices, projects, and experiments related to software architecture issues. | | |
| PLO.S5 | Manage the design problems and ethics related to software architecture. | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Practical Work (written or oral) | Weekly | 25% |
| **2** | Quizzes, Homework assignments | Random | 00% |
| **3** | First mid Term | 8 | 25% |
| **4** | Final Exam | 16 | 50% |

## E. Student Academic Counselling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Office hours
- Blackboard interface

## F. Learning Resources and Facilities

### 1. Learning Resources

| | |
|---|---|
| **Required Textbooks** | 1.https://www.eyrolles.com/Informatique/Livre/architecture-logicielle-9782100578658/<br>2. editions-eni.fr/livre/architecture-logicielle-pour-une-approche-organisationnelle-fonctionnelle-et-technique-2e-edition-9782746099210 |
| **Essential References Materials** | Star uml, eclipse |
| **Electronic Materials** | ● Lecture material in PPT<br>● Any Related material including the YouTube videos relating to engineering measurement<br>Blackboard |
| **Other Learning Materials** | NA |

### 2. Facilities Required

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| **1** | Work carried | Weekly | 20% |
| **2** | Prototype realization | Random | 30% |
| **3** | Final Evaluation | - | 50% |

## G. Course Quality Evaluation

| Item | Resources |
|---|---|
| **Accommodation**<br>(Classrooms, laboratories, demonstration rooms/labs, etc.) | **classroom board software …** |
| **Technology Resources**<br>(AV, data show, Smart Board, software, etc.) | **data show;** |

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Computer Engineering Council |
| **Date** | 07/02/2023 |