Course Title:	**Engineering mathematics / Mathematic Lab**
Course Code:	CSE111/ CSE113
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Pr. Maher RADDAOUI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course identification

1. Credit hours: **4.5 (2-1-1,5)**

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 1.1/3

4. Pre-requisites for this course (if any): Undergraduate analysis, Basic Mathematics, Preparatory Cycle

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..		
2	**Blended**	45 + 22.5	35	80
3	**E-learning**	.....	+	+
4	**Distance learning**	.....	12.5	35
5	**Other ()**	.....		

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	22.5
3	**Tutorial**	15
4	**Others** (specify)	-
	Total	67.5

B. Course Objectives and Learning Outcomes

Course Description

This course covers topics such as linear algebra, differential and integral calculus, differential equations, number series, and probability. Students will learn how to manipulate vectors, calculate derivatives and integrals, solve differential equations, and analyze statistical data. They will acquire skills to model engineering systems, solve mathematical problems and make decisions based on data. This course aims to strengthen the understanding of mathematical concepts and develop the analytical skills of students in order to prepare them to meet the mathematical challenges encountered in their engineering career.

Course Main Objectives

- ✓ To provide engineering students with the mathematical foundations needed to solve complex technical problems found in different engineering specialties.
- ✓ Develop understanding of essential mathematical concepts such as linear algebra, differential and integral calculus, differential equations, Entire and Fourier series, Fourier and Laplace transform and complex functions.
- ✓ Reinforce the skills of manipulation of vectors, matrices and mathematical operations necessary for the analysis and modeling of engineering systems.
- ✓ Allow students to master the techniques of derivation, integration and resolution of differential equations to model and solve real problems encountered in engineering.
- ✓ Introduce the basics of complex analysis and Fourier and Laplace transforms, showing how they are applied in the fields of engineering and signal science.
- ✓ Develop skills in numerical methods, including approximation, interpolation and optimization methods, to solve mathematical and engineering problems using computer tools.
- ✓ Prepare students to apply their mathematical knowledge in real engineering situations, developing their analytical skills and their ability to solve real-world problems.
- ✓ Foster the development of mathematical communication skills, encouraging students to present and explain their mathematical solutions clearly and rigorously.

1. Course Learning Outcomes

CLOs		Aligned PLOs
	Knowledge and understanding	
1.1	✓ Provide engineering students with the mathematical foundations needed to solve complex technical problems.	PLO.K1
1.2	✓ Develop understanding of essential mathematical concepts such as linear algebra, differential and integral calculus, differential equations, number series and probability.	
	Skills	
2.1	✓ Reinforce the skills of manipulation of vectors, matrices and mathematical operations necessary for the analysis and modelling of engineering systems.	PLO.S2
2.2	✓ Allow students to master the techniques of derivation, integration and resolution of differential equations to model and solve real problems encountered in engineering.	
7.1	✓ Foster the development of mathematical communication skills, encouraging students to present and explain their mathematical solutions clearly and rigorously. ✓ Develop skills in numerical methods, including approximation, interpolation and optimization methods, to solve mathematical and engineering problems using computer tools.	PLO.S7

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction to engineering mathematics course**	1
2	**Chapter 1: Linear algebra** 1. Vector spaces, Bases and dimensions 2. Linear applications and matrices, 3. Diagonalization of matrices	6
3	**Chapter 2: Differential calculus:** 1. Limits, 2. Derivatives, 3. Derivation rules	5
4	**Chapter 3: Integral calculus**: 1. Definite integrals, 2. Methods of integration, 3. Applications	6
5	**Chapter 4: Differential equations:** 1. Basic concepts, 2. Linear differential equations, 3. Special solutions	5
6	**Chapter 5: Digital Series** 1. Convergences 2. Numerical series with positive terms 3. Alembert rule	5

No	List of Topics	Contact Hours
7	**Chapter 6: Fourier transforms:** 1. Fourier series, 2. Fourier transforms, 3. Apps	6
8	**Chapter 7: Laplace transforms:** 1. Definitions 2. Properties 3. Calculation of usual cases 4. Apps	6
9	**Chapter 8: Complex analysis:** 1. Complex numbers, 2. Complex functions, 3. Complex integration 4. Residue theorem	6
10	**Chapter 9: Numerical methods:** 5. Approximation, 6. Interpolation, 7. Optimization methods	6.5
10	**Labs:** ✓ **LAB 1:** Introduction to MATLAB ✓ **LAB 2:** Signal generation ✓ **LAB 3:** Analysis and synthesis of signals periodicals ✓ **LAB 4:** Use of DFT for spectral analysis of signals ✓ **LAB 5:** Use of DFT for the estimation of a correlation function	15
Total		67.5

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	✓ Provide engineering students with the mathematical foundations needed to solve complex technical problems. ✓ Develop understanding of essential mathematical concepts such as linear algebra, differential and integral calculus, differential equations, number series and probability.	- Lecturing - Class discussions	- Assignments - Quizzes - Exams
2.0	**Skills**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
PLO.S2	✓ Reinforce the skills of manipulation of vectors, matrices and mathematical operations necessary for the analysis and modeling of engineering systems. ✓ Allow students to master the techniques of derivation, integration and resolution of differential equations to model and solve real problems encountered in engineering.	- Lecturing - Class discussions - projects	- Assignments, - Quizzes - Exams
PLO.S7	✓ Foster the development of mathematical communication skills, encouraging students to present and explain their mathematical solutions clearly and rigorously. ✓ Develop skills in numerical methods, including approximation, interpolation and optimization methods, to solve mathematical and engineering problems using computer tools.	- Lecturing - Class discussions - projects	- Assignments - Quizzes - Exams

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%
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 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1. Stroud, K. A., & Booth, D. J. (2013). Engineering Mathematics. Palgrave Macmillan. 2. Chapra, S. C., & Canale, R. P. (2015). Numerical Methods for Engineers. McGraw-Hill Education. 3. Churchill, R. V., & Brown, J. W. (2019). Complex Variables and Applications. McGraw-Hill Education.

	4. Anton, H., & Rorres, C. (2015). Elementary Linear Algebra: Applications Version. John Wiley & Sons. 5. Tauvel, P., (1999). Analyse complexe, exercices corrigés, Dunod. 6. Amara, M., (2002). Analyse complexe, cours, Collection N Sciences fondamentales. 7. Bahouri, H., Majdoub, M., & Nakouri, A., (2003), Fonction d'une variable complexe, cours et exercices, centre de publication universitaire. 8. Reinhard, H., (1986), Cours de mathématique du signal, Dunod université. 9. Lemasquerier, J.M., (1999), Mathématique pour les sciences physiques, collection sciences fondamentales. 10. Carbon, M., Ghordanzadeh, D., Marry, P., Point, N.,& Denise Vial, D., (1997), Eléments de mathématiques du signal, exercices résolus, Dunod.
Essential References Materials	PC Data projector
Electronic Materials	Lecture material in PPT Any Related material including the YouTube videos relating to engineering measurement Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	**Resources**
Accommodation	**Classroom board** **Computer lab with the necessary software** **Internet access**
Technology Resources	**Data projector**

G. Course Quality Evaluation

Evaluation Areas/Issues	**Evaluators**	**Evaluation Methods**
Effectiveness of teaching and assessment.	Students, Faculty, Program Leaders, Peer Reviewer	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, Peer Reviewer	Direct, Indirect
Quality of Learning resources	Faculty, Program Leaders, Peer Reviewer	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders, Peer Reviewer	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	11/10/2022

Course Title:	**Applied Probabilities and Statistics**
Course Code:	CSE112
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 (2-1-0)

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 1.1/3

4. Pre-requisites for this course (if any): Undergraduate Mathematics, Basic Mathematics, Preparatory Cycle

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..	35	80
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

The objective of this course Applied Probabilities and Statistics (using the R programming language) is to provide a practical understanding of probability theory and statistical methods in engineering applications. The course aims to provide students with the necessary skills and tools to analyze and interpret data, and to make informed decisions based on statistical evidence.

Course Main Objective

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

- ✓ How to use the R programming language to apply these concepts and methods to real-world engineering problems, such as quality control in manufacturing, reliability analysis, optimization, and experimental design.
- ✓ Have a solid foundation in probability distributions, hypothesis testing, confidence intervals, regression analysis, ANOVA, experimental design, and statistical quality control.
- ✓ Understand and apply the basic principles of probability theory and statistical analysis, use R to analyze and interpret data, and communicate their findings effectively to others.

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	✓ Use the R programming language to apply these concepts and methods to real-world engineering problems, such as quality control in manufacturing, reliability analysis, optimization, and experimental design.	PLO.K1
2	**Skills**	
2.1	✓ Understand and apply the basic principles of probability theory and statistical analysis, use R to analyze and interpret data, and communicate their findings effectively to others.	PLO.S2
2.2	✓ Have a solid foundation in probability distributions, hypothesis testing, confidence intervals, regression analysis, ANOVA, experimental design, and statistical quality control.	PLO.S7

C. Course Content

No	List of Topics	Contact Hours
01	**Chapter 1: Mathematical Foundations** ✓ Linear algebra ✓ Topology ✓ Differential calculus ✓ Algorithm	7
02	**Chapter 2: Basics of R** ✓ Introduction ✓ Basics of Programming ✓ Decision-Making and Loop Statements ✓ Graphics	7

03	**Chapter 3: Optimality Conditions** ✓ First-Order Necessary Condition ✓ Second-Order Necessary Condition ✓ Second-Order Sufficient Condition	7
04	**Chapter 4: Conjugate Gradient Methods** ✓ Introduction ✓ Basics of Conjugate Direction ✓ Convergence Analysis of Conjugate Direction Method ✓ Method of Conjugate Gradient	7
05	**Chapter 5: Newton's Method** ✓ Introduction ✓ Newton's Method for Multiple Unknowns ✓ Convergence Analysis of Newton's Method ✓ Modified Newton's Method	7
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	✓ Use the R programming language to apply these concepts and methods to real-world engineering problems, such as quality control in manufacturing, reliability analysis, optimization, and experimental design.	- Lecturing - Class discussions	- Assignments, - Exams
2.0	**Skills**		
PLO.S2	✓ Understand and apply the basic principles of probability theory and statistical analysis, use R to analyze and interpret data, and communicate their findings effectively to others.	- Lecturing - Class discussions - Work in small groups	- Assignments, - Exams
PLO.S7	✓ Have a solid foundation in probability distributions, hypothesis testing, confidence intervals, regression analysis, ANOVA, experimental design, and statistical quality control	- Lecturing - Class discussions - Work in small groups	- Assignments, - 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 %
3	First mid Term	8	35%
4	Final Exam	16	65%

E. Student Academic Counselling 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] Peter Dalgaard, Introductory Statistics with R. Springer, 2002. [2] Maria L. Rizzo, Statistical Computing with R. Chapman & Hall/CRC, 2008.
Essential References Materials	PC DATA-SHOW
Electronic Materials	Lecture material in PPT Any Related material including the YouTube videos relating to engineering measurement Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	**Resources**
Accommodation	**Classroom board**
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

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders,	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	11/10/2022

Course Title:	**Analog Electronic**
Course Code:	CSE121
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Slim AWALI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course Identification

1. Credit hours: 1.5(1-0.5-0)

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 1.1/3

4. Pre-requisites for this course:

Master the manipulation of complex numbers, Basic electrical circuits, Mathematics

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..	14	36.5
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 analog electronics course is an introduction to electronic circuits that use continuous signals. Students will learn the fundamentals of operational amplifiers, analog filters, oscillators, and voltage regulator circuits. Theoretical and practical aspects will be covered, including design, analysis and problem solving. The skills acquired in this course are useful for future engineers and professionals in the field.

Course Main Objective

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

- ✓ Understand the fundamentals of analog electronics, including the laws of electricity and the basic principles of electronic components.
- ✓ Know how to design and analyze simple electrical circuits such as RC circuits, RL circuits and RLC circuits.
- ✓ Know how to design basic amplifier circuits, such as non-inverting amplifiers, inverting amplifiers, summing amplifiers, difference amplifiers, etc.
- ✓ Developing knowledge of different types of amplifier circuits
- ✓ Master how to design and analyze electronic filters, such as low-pass filters, high-pass filters, band-pass filters, etc.
- ✓ Understanding the various applications of these components

1. Course Learning Outcomes

CLOs		Aligned PLOs
	Knowledge and understanding	
1.1	✓ Understand the fundamentals of analog electronics, including the laws of electricity and the basic principles of electronic components.	PLO.K1
1.2	✓ Know how to design and analyze simple electrical circuits such as RC circuits, RL circuits and RLC circuits	
	Skills	
1.1	✓ Design basic amplifier circuits, such as non-inverting amplifiers, inverting amplifiers, summing amplifiers, difference amplifiers, etc.	PLO.S1
1.2	✓ Design and analyze electronic filters, such as low pass filters, high pass filters, band pass filters, etc.	
5.1	✓ Master how to design and analyze electronic filters, such as low-pass filters, high-pass filters, band-pass filters, etc.	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
Module 1	Basics of electronics	5
Module 2	Quadrupoles and electrical filters	5
Module 3	The P-N junction and the diode	4.5
Module 4	Bipolar transistors	4
Module 5	Operational amplifier	4
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	✓ Understand the fundamentals of analog electronics, including the laws of electricity and the basic principles of electronic components. ✓ Know how to design and analyze simple electrical circuits such as RC circuits, RL circuits and RLC circuits	- Lecturing - Group work - discussion	Exams
2.0	**Skills**		
PLO.S1	✓ Design basic amplifier circuits, such as non-inverting amplifiers, inverting amplifiers, summing amplifiers, difference amplifiers, etc. ✓ Design and analyze electronic filters, such as low pass filters, high pass filters, band pass filters, etc.	- Lecturing - Group work - discussion	Exams,
PLO.S5	✓ Master how to design and analyze electronic filters, such as low-pass filters, high-pass filters, band-pass filters, etc	- Lecturing - Group work - discussion	Exam

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%
4	Final Exam	16th	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 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1) Albert Paul Malvino, David J. Bates (2016), Principles of electronics Courses and corrected exercises, Sciences sup collection - Engineering sciences, Dunod edition 09/11/2016 (8th edition). 2) Gilles Choisy (2003), Electronics, Course summary and corrected problems, Edition Ellipses, 08/08/2003. 3) Sedra/smith: Microelectronic circuits, Oxford University Press, 2003 - 5e edition 4) Design with operational amplifiers and analog Integrated circuits Sergio Franco ISBN 0-07-120703-1
Essential References Materials	PC DATA-SHOW
Electronic Materials	Lecture material in PPT Any Related material including the YouTube videos relating to engineering measurement Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	**Resources**
Accommodation	**Classroom board**
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	11/10/2022

Course Title:	**Digital circuits**
Course Code:	CSE122
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Oussama BOUFARES
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course Identification

1. Credit hours: **3 (1.5-0.75-0.75)**
2. Course type **a.** College ☐ Department ■ Others ☐ **b.** Fundamental ■ Transversal ☐ Optional ☐
3. Level/year at which this course is offered: 1.1/3
4. Pre-requisites for this course: *Gates and Boolean logic;*

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study Hours	Total workload
1	**Traditional classroom**	.....	35	80
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

This course allows the student to enrich his knowledge of digital electronics and logic circuits. In the first part, we will learn basic logical operations, the simplification of logical functions, as well as the use of Karnaugh maps to minimize a given logical function. In the second part, we will also discover the binary number system, the multiplexer, the adder, the encoder...
In the last part of this course, we will study sequential logic which includes explanations of flip-flops, up/down counters, memories and registers and which also includes programmable logic networks.

Course Main Objective

At the end of this course, the engineering student will have to:

- Understand the digital electronics and main digital integrated circuits used in computer systems.
- Deal combinatorial systems and sequential systems.
- Able to model a digital circuit.

1. Course Learning Outcomes

CLOs		Aligned PLOs
	Knowledge and Understanding	
1.1	✓ Understand the digital electronics and main digital integrated circuits used in computer systems.	PLO.K1
3.1	✓ Deal combinatorial systems and sequential systems.	PLO.K3
2	**Skills**	
2.1	✓ - Able to model a digital circuit.	PLO.S2

C. Course Content

No	List of Topics	Contact Hours
1	➢ **Course:** - Numbering systems and the concept of codes - Number systems: signed numbers (Sign-Absolute Value, 1's complement, 2's complement) - Number coding: Grey, BCD, ASCII - Real numbers: fixed point, simplified floating point, comma - Binary arithmetic operations: n-bit addition, subtraction, multiplication, division ➢ **Tutorial:** - Binary numeric calculations with the different formats of signed numbers and real numbers - Arithmetic and logical operations	7
2	➢ **Course:** - Representation and simplification of combinatorial logic functions. - Representation of combinatorial logic functions. - Simplification of combinatorial logic functions.	5

No	List of Topics	Contact Hours

3	- Combinatorial logic circuits
	  - Coder/ Decoder
	  - Transcoder
	  - Multiplexer/ Demultiplexer
	  - Comparator
	  - Adders and subtractors
	➢ **Tutorial:**
	- Combinatorial systems: reminders on the simplification of logic systems, coders/decoders, multiplexers/ demultiplexers, etc.
		7

4	➢ **Course:**
	  - Sequential logic
	  - The scales
	  - The registers
	  - Counters
	  - Memory
	➢ **Tutorial:**
	- **S**equential systems: reminders on shift registers and counters
		7

5	- Programmable logic circuitsPrinciple of the first PLDs - PLDs classification - PALs (Programmable Array Logic) - GALs (Generic Array Logic) ➢ **Tutorial:** - Programming of PLD-GAL (combinatorial, sequential)	7
	Labs : Lab1: Logic Gates Lab2: Combinatorial Circuits Lab3: Sequential Circuits: Flip-Flops Lab4: Up-Down Shift Register	12
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	✓ Understand the basics of digital electronics and main digital integrated circuits used in computer systems.	- Lectures - Tutorials	- Course project report & presentation - Written exams - Homework
PLO.K3	✓ Deal combinatorial systems and sequential systems.		
2.0	**Skills**		
PLO.S2	✓ Able to model a digital circuit.	- Course project - Lectures - Tutorials - Assignment work	- Course project report & presentation - Written exams - Homework

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		
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 - Students workshop area

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- Hichem Trabelssi, “combinatorial logic systems and sequential logic” Edition 2010, - Patterson, D., Hennessy, J. “Computer Architecture, The hardware/software interface”, édition Morgan Kaufman.1996 - DIGITAL CIRCUITS AND DESIGN; Salivahanan; Oxford University Press; 2018.
Essential References Materials	- PC - Data show - logic function simulation bench

Electronic Materials	- Lecture material in PPT - Any Related material including the YouTube videos relating to engineering measurement. - Blackboard

2. **Facilities Required**

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022

Course Title:	**Algorithm and data structure**
Course Code:	CSE131
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: 1.1/3
4. Pre-requisites for this course (if any): Logical Mathematics, Simple data structures

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..	31	76
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**	00
3	**Tutorial**	15
4	**Others** (specify)	.....
	Total	45

B. Course Objectives and Learning Outcomes

Course Description

This course provides a comprehensive introduction to data structures and algorithms using the C++ programming language. Students will learn the fundamental principles of organizing and processing data efficiently. The course covers a range of data structures, abstract data types, design patterns, and algorithmic techniques to solve real-world problems.

Course Main Objective

- ✓ A thorough understanding of advanced data structures, such as binary trees, graphs, heaps, hash tables, linked lists, and the ability to choose the appropriate data structure based on the problem requirements.
- ✓ In-depth knowledge of advanced algorithms, including sorting algorithms, search algorithms, graph traversal algorithms, and the ability to design efficient algorithms to solve complex problems.
- ✓ The ability to design and implement algorithmic solutions to solve complex computational problems, taking into account time and space constraints.
- ✓ The ability to write clear, well-structured technical reports that explain concepts related to algorithms and data structures, as well as the results of their application. Reports should be accurate, concise and tailored to the target audience.
- ✓ The ability to present research results related to algorithms and data structures in a professional manner, whether at academic conferences, industry meetings, or other research forums.
- ✓ The skill to design efficient algorithms and choose appropriate data structures based on project needs.
- ✓ The ability to implement algorithms and data structures using appropriate programming languages, following coding standards and ensuring code quality.

1. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and understanding**	
1.1	✓ A thorough understanding of advanced data structures, such as binary trees, graphs, heaps, hash tables, linked lists, and the ability to choose the appropriate data structure based on the problem requirements.	PLO.K1
1.2	✓ In-depth knowledge of advanced algorithms, including sorting algorithms, search algorithms, graph traversal algorithms, and the ability to design efficient algorithms to solve complex problems.	
1.3	✓ The ability to design and implement algorithmic solutions to solve complex computational problems, taking into account time and space constraints.	
2	**Skills**	
2.1	✓ The ability to write clear, well-structured technical reports that explain concepts related to algorithms and data structures, as well as the results of their application. Reports should be accurate, concise and tailored to the target audience.	PLO.S2

CLOs		Aligned PLOs
2.2	✓ The ability to present research results related to algorithms and data structures in a professional manner, whether at academic conferences, industry meetings, or other research forums.	
7.1	✓ The skill to design efficient algorithms and choose appropriate data structures based on project needs.	PLO.S7
7.2	✓ The ability to implement algorithms and data structures using appropriate programming languages, following coding standards and ensuring code quality.	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to algorithmic and algorithmic environment	1
2	Data structures, abstract data types, design patterns	2
3	Arrays, Iteration, Invariants	2
4	Record, Lists, Recursion, Stacks, Queues	4
5	Requirements for searching	2
6	Efficiency and Complexity	2
8	Binary Search Trees	2
9	Priority Queues and Heap Trees	2
10	Sorting	2
11	Hash Tables	4
12	Graphs	2
13	Exam	2
No	**List of Topics**	**Contact Hours**
1	Tutorial 1: Conditional and iterative structure, Arrays, Invariants, Record	3
2	Tutorial 2: Lists, Recursion, Stacks, Queues	4
3	Tutorial 3: Requirements for searching, Efficiency and Complexity	3
4	Tutorial 4: Tree data structure	3
5	Tutorial 5: Priority Queues and Heap Trees	3
6	Tutorial 6: Hash Tables	3
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	✓ A thorough understanding of advanced data structures, such as binary trees, graphs, heaps, hash tables, linked lists, and the ability to choose the appropriate data structure based on the problem requirements. ✓ In-depth knowledge of advanced algorithms, including sorting algorithms, search algorithms, graph traversal algorithms, and the ability to design efficient algorithms to solve complex problems. ✓ The ability to design and implement algorithmic solutions to solve complex computational problems, taking into account time and space constraints.	• Lecturing • Tutorial • Problem-Based Learning • Project-Based Learning	Assignments, Homework Quizzes, Exams,
2.0	**Skills**		
PLO.S2	✓ The ability to write clear, well-structured technical reports that explain concepts related to algorithms and data structures, as well as the results of their application. Reports should be accurate, concise and tailored to the target audience. ✓ The ability to present research results related to algorithms and data structures in a professional manner, whether at academic conferences, industry meetings, or other research forums	• Lecturing • Tutorial • Problem-Based Learning • Project-Based Learning	Assignments, Homework Quizzes, Exams, Report,
PLO.S7	✓ The skill to design efficient algorithms and choose appropriate data structures based on project needs. ✓ The ability to implement algorithms and data structures using appropriate programming languages, following coding standards and ensuring code quality.		

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	10%
3	First mid Term	8	25%
5	Final Exam	16	65%

E. Student Academic Counselling 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. "Data Structures and Algorithm Analysis in C++" by Mark A. Weiss 2. "C++ Plus Data Structures" by Nell Dale and Chip Weems 3. Lecture Notes for Data Structures and Algorithms, School of Computer Science University of Birmingham Birmingham, UK,2019 4. Sachi Nandan Mohanty, Pabitra Kumar Tripathy, Data Structure and Algorithms Using C++, Scrivener Publishing 2021
Essential References Materials	
Electronic Materials	● Lecture material in PPT ● Any Related material including the YouTube videos relating to engineering measurement ● Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board**
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	11/10/2022

Course Title:	**Programming Workshop C++**
Course Code:	CSE132
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 (0-0-3)**
2. Course type **a.** College ☐ Department ■ Others ☐ **b.** Fundamental ■ Transversal ☐ Optional ☐
3. Level/year at which this course is offered: 1.1/3
4. Pre-requisites for this course (if any): Basic programming (variables, loops, conditions and functions), POO

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..	35	80
2	**Blended**	22.5		
3	**E-learning**	.....		
4	**Distance learning**	.....		
5	**Other (project)**	22.5		

2. Contact Hours (based on academic semester)

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

B. Course Objectives and Learning Outcomes

Course Description

This is an introductory C++ language course. It aims to discover the C++ programming environment, know how to react to a programming problem and to provide a modern knowledge of programming so that a student can solve problems related to his discipline, should enable to: acquire basic programming concepts; acquire knowledge of the C++ language; the concept of class, use and implement abstract data types (stack, queue and linked list).

Course Main Objective

- ✓ Get familiar with the C++ programming environment
- ✓ Know the syntactic, semantic aspect and the concepts necessary for C++ programming (identifiers, declaration, operators, instructions, modules, structures, etc.),
- ✓ Learn the concept of class in C++ and start the type array, string of characters, records, pointers.
- ✓ Write correct programs starting from simple programs to complex programs.
- ✓ Know how to react to a programming problem using operations performed with STACK, Queue, Linked List.
- ✓ Master the tree structure, graph, Searching and Sorting, Hashing.

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Get familiar with the C++ programming environment	PLOK.1
1.2	Know the syntactic, semantic aspect and the concepts necessary for C++ programming (identifiers, declaration, operators, instructions, modules, structures, etc.),	
1.3	Learn the concept of class in C++ and start the type array, string of characters, records, pointers.	
2	**Skills**	
2.1	Write correct programs starting from simple programs to complex programs.	PLOS.2
2.2	Know how to react to a programming problem using operations performed with STACK, Queue, Linked List.	
2.3	Master the tree structure, graph, Searching and Sorting, Hashing.	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
1	Review of Concepts "C++ "	3
2	Basics structure of a programs using Array, function, pointer, structure	5
3	Sparse Matrix	3
4	Concepts of Class	3
5	Operations Performed With STACK	3
6	Queue	3
7	Linked List	3
8	TREE	3.5
10	Binary trees	3
11	Graph	4
12	Searching and Sorting	3
13	Hashing	3
14	Stacks and queues structures	3.5
15	MidTerm-2	2
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	✓Get familiar with the C++ programming environment ✓Know the syntactic, semantic aspect and the concepts necessary for C++ programming (identifiers, declaration, operators, instructions, modules, structures, etc.), ✓Learn the concept of class in C++ and start the type array, string of characters, records, pointers.	Lecturing Practical work	Assignments, Quizzes, Exams,
2.0	**Skills**		
PLO.S2	✓ Write correct programs starting from simple programs to complex programs. ✓ Know how to react to a programming problem using operations performed with STACK, Queue, Linked List.	Practical work projects	Assignments, Quizzes, Exams,
PLO.S5	✓ Master the tree structure, graph, Searching and Sorting, Hashing.	Practical work - Class discussions - Assignments	Assignments, Report, Quizzes, Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		- projects	

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 (Project)	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 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1. https://cplusplus.com/ 2. Sachi Nandan Mohanty, Pabitra Kumar Tripathy, Data Structure and Algorithms Using C++, Scrivener Publishing 2021 3. Claude Delannoy, Learn C++
Essential References Materials	4. Sachi Nandan Mohanty, Pabitra Kumar Tripathy, Data Structure and Algorithms Using C++, Scrivener Publishing 2021 5. Claude Delannoy, Learn C++
Electronic Materials	● Lecture material in PPT ● Any Related material including the YouTube videos relating to engineering measurement. ● Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **Internet access**
Technology Resources	**Data projector**

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students, Faculty, Program Leaders, Peer Reviewer	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, Peer Reviewer	Direct, Indirect
Quality of Learning resources	Faculty, Program Leaders, Peer Reviewer	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders, Peer Reviewer	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	11/10/2022

Course Title:	**Formal Logic**
Course Code:	CSE141
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 (2-1-0)

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 1.1/3

4. Pre-requisites for this course: Propositional logic: logical connectors (AND, OR, NOT, IMPLICATION, etc.) and associated truth tables, Mathematical notations.

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**	30
2	**Laboratory/Studio**	-
3	**Tutorial**	15
4	**Others** (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

Course Description

This course represents mathematical logic and automatic deduction techniques. It presents two models of reasoning based on the logic of propositions and the logic of predicates. We examine propositional logic and first-order predicate logic. We discuss the links between the formal aspects in these logics and the statements expressed informally. Different methods of formal proof are presented and applied.

Course Main Objective

- ✓ Acquire prior knowledge of formal logic.
- ✓ Apply principles of formal logic to identify, formulate, and solve complex problems.
- ✓ Ability to use formal logic facilities to resolve problems
- ✓ Conclude effectively the basics, principles, and theories related to formal logic with other disciplines

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	✓ Prior knowledge of formal logic.	PLO.K1
1.2	✓ Apply principles of formal logic to identify, formulate, and solve complex problems.	
1.3	✓ The basics, principles, and theories related to formal logic with other disciplines	
	Skills	
1.1	✓ Use formal logic facilities to resolve problems	PLO.S1
5.1	✓ The ability to analyze the structure of complex propositions, identifying key components and the relationships between them.	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
1	**Chapters** Introduction to the formal logic	4
2	Propositional logic: -Language: connectors, propositional variables	3
3	Interpretation of formulas	3
4	Models (semantics), validity and inconsistency	3
5	Equivalence between formulas Substitution	4
6	Normal forms	3
7	Logical consequence	3
8	Formal system of the logic of propositions and Proof (axiomatic)	3

9	Logic of first-order predicates: Term, atoms and well-formed formulas	3
10	Interpretation of formulas Validity, inconsistency and semantic model	3
11	Logical consequence	4
12	Prenex Normal Form, Skolem and Clausale	3
13	Herbrand's theorem for the resolution Formal System of Predicate Logic and Proof (axiomatic)	3
Some properties: Completeness, Consistency and Decidability		3
Total		45

C.2. Tutorial Content

No	List of Topics	Contact Hours
1	TD1 : Propositional computation	4.5
2	TD2 **:**Axioms, theorems and demonstration	3
3	TD3 : Logic of first-order predicates computation	3
4	TD4 :Prenex, Normal Form, Skolem and Clausale	3
5	TD5 : Resolution method and Proof	3
6	TD6 : Herbrand's theorem for the resolution	3
7	TD7 : Case study	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	✓ Prior knowledge of formal logic. ✓ Apply principles of formal logic to identify, formulate, and solve complex problems. ✓ The basics, principles, and theories related to formal logic with other disciplines	Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
PLO.S1	✓ Use formal logic facilities to resolve problems	- Lectures - Class discussions - Assignments - projects	Assignments, Report, Quizzes, Exams
PLO.S5	✓ The ability to analyze the structure of complex		Assignments, Report, Quizzes,

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	propositions, identifying key components and the relationships between them.		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%
3	First mid Term	8	35%
4	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:
- Office hours - Blackboard interface - Academic advisor - Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	• Notions de Logique Formelle [Book Review] J. M. P.Review of Metaphysics 19 (4):809-809 (1966) • Logique du premier ordre (Une introduction pour les linguistes) Pascal Amsili (Université de Paris 7) amsili@linguist.jussieu.fr Atelier logique et sémantique du langage naturel Semaine bordelaise de sémantique formelle 27-29 mars 2006
Essential References Materials	• https://doi.org/10.4000/philosophiascientiae.654
Electronic Materials	- **Lecture material in PPT** - **Any Related material including the YouTube videos relating to engineering measurement** - **Blackboard**
Other Learning Materials	- NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022

Course Title:	**Algorithmics of numerical analysis**
Course Code:	CSE142
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

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 1.1/3

4. Pre-requisites for this course (if any): Ordinary differential equations, standard integration techniques, basic matrix operations, data structure

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**	12.5
2	**Laboratory/Studio**	22.5
3	**Tutorial**	10
4	**Others** (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

Course Description

The "Numerical Analysis Algorithm" course explores different essential parts of numerical analysis. It begins with error analysis, studying rounding and truncation errors that can occur during numerical calculations. Then it focuses on nonlinear equations and presents techniques for finding approximate solutions to these equations using iterative methods such as Newton's method.

The course also covers iterative methods for solving linear systems. It examines algorithms such as the Gauss-Seidel method and the Jacobi method, which can efficiently solve systems of linear equations.

Finally, the course deals with interpolation, studying methods for representing complex functions by polynomials or other simpler functions. Interpolation is an essential technique for obtaining accurate numerical approximations.

Overall, this course provides students with the knowledge and skills to analyze errors, solve nonlinear equations, use iterative methods for linear systems, and perform numerical interpolation. These skills are crucial for solving complex mathematical and scientific problems using numerical tools.

Course Main Objective

- ✓ Understand the fundamental concepts of numerical analysis and acquire a solid knowledge base in this field.
- ✓ Study the numerical methods used to solve complex mathematical and scientific problems.
- ✓ Learn to analyze and quantify approximation errors in numerical calculations.
- ✓ Acquire practical skills to implement and use numerical analysis algorithms.
- ✓ Master interpolation and numerical approximation techniques to represent complex functions.
- ✓ Understand the methods of numerical resolution of nonlinear equations.
- ✓ Learn iterative methods for solving systems of linear equations.
- ✓ Be able to perform advanced numerical calculations such as numerical integration and numerical solution of ordinary differential equations.
- ✓ Develop the ability to choose and adapt the appropriate numerical methods to solve specific problems.
- ✓ Apply the knowledge and skills acquired in scientific and engineering fields to solve real problems using digital tools.

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	✓ Understand the fundamental concepts of numerical analysis and acquire a solid knowledge base in this field.	PLO.K1
1.2	✓ Study the numerical methods used to solve complex mathematical and scientific problems	
	Skills	

CLOs		Aligned PLOs
1.1	✓ Acquire practical skills to implement and use numerical analysis algorithms.	PLO.S1
1.2	✓ Apply the knowledge and skills acquired in scientific and engineering fields to solve real problems using digital tools-	
1.3	✓ Develop the ability to choose and adapt the appropriate numerical methods to solve specific problems.	
5.1	✓ Be able to perform advanced numerical calculations such as numerical integration and numerical solution of ordinary differential equations.	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
1	**Chapter0 : Error Analysis** 0.1. Introduction 0.2. Modeling errors 0.3. Representation of numbers 0.4. Errors due to representation 0.5. Floating point arithmetic 0.6. Truncation errors	6
2	**Chapter 1: Nonlinear equations** 1.1 Introduction 1.2 Bisection method 1.3 Fixed points method 1.4 Newton's method 1.5 Secant method	6
3	**Chapter 2: Systems of Algebraic Equations** 2.1 Introduction 2.2 Linear systems 2.3 Basic row operations 2.4 Elimination of Gauss 2.5 LU decomposition 2.6 Symmetric positive definite matrices and Chloesky decomposition 2.7 Band matrix 2.8 Ill-conditioned systems 2.9 Overdetermined systems and least squares method 2.10 Nonlinear systems	6
4	**Chapter 3: Iterative methods for linear systems** 3.1. General	6

No	List of Topics	Contact Hours
	3.2. Jacobi and Gauss-Seidel methods 3.3. Relaxation method and SSOR 3.4. Gradient and conjugate gradient methods	
5	**Chapter 4: Interpolation** 4.1 Introduction 4.2 Vandermonde Matrix 4.3 Lagrange interpolation 4.4 Newton's polynomial 4.5 Interpolation error 4.6 Cubic splines 4.7 Kriging	6
6	**Practical work :** TP0: Introduction to Python TP1: Getting started with the Numpy library TP2: Algorithms of bisection, Fixed point, Newton and secant TP3: Factorizations of Gauss, LU and Chlolesky TP4: Jacobi, Gauss-Seidel and Relaxation algorithms TP5: Lagrange, Newton and cubic spline interpolations	15
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**		
K1	✓ Understand the fundamental concepts of numerical analysis and acquire a solid knowledge base in this field. ✓ Study the numerical methods used to solve complex mathematical and scientific problems	- Lectures - Class discussions	Assignments, Exams
2.0	**Skills**		
S1	✓ Acquire practical skills to implement and use numerical analysis algorithms. ✓ Apply the knowledge and skills acquired in scientific and engineering	- Lectures - Class discussions - Assignments - projects	Assignments, Report, Quizzes, Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	fields to solve real problems using digital tools- Develop the ability to choose and adapt the appropriate numerical methods to solve specific problems.		
S2	✓ . Be able to perform advanced numerical calculations such as numerical integration and numerical solution of ordinary differential equations.	- Lectures - Class discussions - Assignments - projects	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	15%
2	Quizzes, Homework assignments	Random	10 %
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 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1-André FORTIN "analyse numérique pour ingénieurs" quaterième edition 2011. 2- Jacques Rappaz, Marco Picasso "Introduction à l'analyse numérique" 2004, Presses polytechniques et universitaires ,romandes
Essential References Materials	PC DATA-SHOW
Electronic Materials	Lecture material in PPT Any Related material including the YouTube videos relating to engineering measurement Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022

Course Title:	**English I: TOEIC B1,1 Certification**
Course Code:	LAC151
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Mrs. Rim RADDADI
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: 1.1/3
4. Pre-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 prepares learners to sit for the toeic reading and listening test B1 level. It is conceived so that the learners would develop their listening and reading skills. The course provides them with tips and techniques for answering correctly and managing their time properly
Topics to be considered are compture technology and computer components
This course is student centered and incorporates the 21st century skills in the ELT (English Language Teaching) classrooms, hence, creativity, collaboration, critical thinking, and communication are essential components of the learning process.

Course Main Objectives

- listen for general information and listening for details
- Reading for general information and reading for details
- Understand topics around computer technology and computer problems
- Acquire tips and technique for the toeic exam
- Analysec graphics, visuals, tables, and diagrams orally or transfer them into a written text.

1. Course Learning Outcomes

CLOs		Aligned PLOs
	Knowledge and Understanding	
1.1	✓ Demonstrate an advanced understanding of computer science engineering principles	PLO.K1
	Skills	
1.1	✓ Analysec graphics, visuals, tables, and diagrams orally or transfer them into a written text.	PLO.S1

C. Course Content

No	List of Topics	Contact Hours
1 computers today	- living in a digital age - computer essential - inside the system	PLO.S7
2 input output devices	- type click and talk - display screen and ergonomics - devices for the disabled	5.5
3 storage devices	- magnetic storage. - optical storage - flash memory	5
5 Basic software	- The processing system - Word processing - Spreadsheets and database	5
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**		
PLOK.1	- Demonstrate an advanced understanding of computer science engineering principles	- Activities	Placement test Indirect assessment Exercises Peer to peer assessment
2.0	**Skills**		
PLO S.1	- Analyse graphics, visuals, tables, and diagrams orally or transfer them into a written text	- T. B. L And - P.B. L - Activities	- Recording a conversation. - Quizzes - Exercises - Peer to peer assessment.

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 Counselling 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	- Murphy, Raymond. English Grammar in Use. Fifth Edition. Cambridge University Press. 2019.
Essential References Materials	- Eastwood, John. Oxford guide to English grammar. Oxford University Press. 1997.
Electronic Materials	- You tube videos - Breaking news english.com
Other Learning Materials	- NA

2. Facilities Required

Item	**Resources**
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022

Course Title:	**French I: Communication technique & preparation for Delf B1,1**
Course Code:	LAC152
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Noureddine AMEUR
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: 1.1/3
4. Pre-requisites for this course (if any): Basic knowledge in French

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

Communication is a purely interdisciplinary science that concerns several fields of knowledge, but what interests us in this course is precisely communication in French.

For a student, it is necessary to acquire a sufficient number of linguistic skills to produce an accurate communication process. Similarly, he or she must be able to express himself or herself correctly in oral and written form in a more advanced professional setting, which presupposes an adequate command of the French language itself and of certain computer tools.

Course Main Objective

The student should be able to:

- Acquire knowledge of organisational communication.
- Express themselves orally in front of an audience or in a small group, in terms of expression as such, gestures, attitudes and mastery of the material assigned to them.
- 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.
- Acquire the necessary skills to enter professional life.

1. Course Learning Outcomes

CLOs		Aligned PLOs
	Knowledge and Understanding	
1.2	✓ 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.	PLOK.1
	Skills	
1.1	✓ 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.	PLOS.1
7.1	✓ Acquire the necessary skills to enter professional life.	PLO.S7

C. Course Content

No	List of Topics	Contact Hours
1	Presentation of the course and level test through a discussion topic.	2
2	Communication: definition, types and obstacles.	2,5
3	Written and oral communication in French.	3
4	Professional writing (reports, minutes, notes, summaries, cover letters, CV...)	3
5	Difference between a personal letter and a professional letter.	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**		
PLO.K1	✓ 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**		
PLO.S1	✓ 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. ✓ Professional writing: writing an agenda, a memo, a summons, letters, reports, minutes, etc.	- Lecturing - Tutorials - Courses project	- Assignments, Quizzes, Exams, - Assignments, Quizzes, Exams,
PLO.S7	✓ Acquire the necessary skills to enter professional life.	- Lecturing - Tutorials - Courses project	-

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	00%
2	Quizzes, Report & assignments	Random	00%
3	Midterm exam	8	00%
4	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 - Blackboard - 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). - 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:** - https://www.podbean.com/podcast-detail/hvdrf-37d03/Learn-French-with-French-Podcasts---Fran%C3%A7ais-avec-Pierre - https://www.printbasprix.com/blog/quest-ce-que-communication-professionnelle/ - https://www.reussirmavie.net/Comment-preparer-son-entretien-d-embauche_a118.html
Electronic Materials	- Lecture material in Word & PDF… - Any Related material including the YouTube videos relating to Communication French.
Other Learning Materials	- NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022

Course Title:	**Economics and Business Management**
Course Code:	LAC153
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. SAFA ELGHAIEB
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:	1.1/3
4. Pre-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**	15
2	**Laboratory/Studio**	
3	**Tutorial**	7.5
4	**Others** (specify)	-
	Total	22.5

B. Course Objectives and Learning Outcomes

Course Description

- This course will Allows the student to have an idea of the basic notions of economics and business management.
- Business economics is at the border between traditional microeconomics, managerial economics, industrial organization and administrative sciences.
- This course introduces simple economic analysis tools that are used to identify the explanatory factors and the levers of business performance. It includes the presentation, on the one hand, of the company and its various functions, on the other hand, of formalized models and commonly used managerial tools, which make it possible to approach the real conditions of decision-making in the company.

Course Main Objective

- ✓ The initiation to the control of the organization and the functioning of the companies.
- ✓ Master the interactivity of the company and its environment.
- ✓ Study the main economic functions of economic agents.
- ✓ Master the main economic & management theories (i.e.: Scientific management theory, administrative management theory, human relations theory…).
- ✓ Understand and apply the fundamental principles of business management.
- ✓ Use the techniques necessary to carry out the main tasks of the manager (planning, organization, animation, control).
- ✓ The study of technical tools and methods quantitative.
- ✓ React positively to a managerial situation.
- ✓ The interpretation of some indicators of business performance.
- ✓ Developing the forecasting approach.
- ✓ Master strategic planning and forward-looking approach.
- ✓ Master the management functions: production, marketing, finance, human resources, research and development.

1. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and understanding**	
1.1	✓ Study the main economic functions of economic agents	PLO.K1
1.2	✓ Understand and apply the fundamental principles of business management.	
1.3	✓ Use the techniques necessary to carry out the main tasks of the manager (planning, organization, animation, control).	
2	**Skills**	
2.1	✓ Master the management functions: production, marketing, finance, human resources, research and development. ✓ Master strategic planning and forward-looking approach.	PLO.S2
5.1	✓ The interpretation of some indicators of business performance. ✓ Developing the forecasting approach.	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
1	**Chapter 1: Economic agents** I Definition II The different economic agents. 1 Companies. 2 Households 3 Public administrations. 4 Financial and quasi-financial institutions 5 The rest of the world (outside). III The main economic functions of economic agents 1The production of market goods and services. 2 Production of non-market services. 3 Consumption. 4 The economic and financial function 5 The redistribution function IV The economic circuit.	4.5
2	**Chapter 2: the company and business environment** **Section 1: the company** I. Definitions II. Classification of companies. III. Business functions. IV. Business relationships. **Section 2: the business environment** I Definition of the environment II The different types of environment III Diagnosis of the environment IV The interactivity of the company and its environment	4.5
3	**Chapter 3: The main theories of management** I. Scientific management theory. II. Administrative management theory. III. Human relations theory. IV. Contingency management theory. V. The quantitative theory	4.5
4	**Chapter 4: the management functions** **Section 1: The production function** I Definition II The technical classification of types of production III Factors in the evolution of production methods IV Standardization of production V The objectives of the production function VI The phases of the production process VII Quality management **Section 2: The marketing function** I Definition II The different concepts of marketing III Marketing function management procedure and tools **Section 3: The financial function**	4.5

No	List of Topics	Contact Hours
	I Definition II The objectives of the finance function III Role of the finance function IV The cycles of business operations V The need for financing **Section 4: The human resources function** I Definition II Evolution of the human resources function III The tasks of the human resources department IV Areas of human resource management **Section 5: The research and development function** I Definition II The research phases III Relationship of the R&D function with the other functions of the company IV R&D constraints V The justification of the R&D function VI Funding for R&D	
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 basics of economics and organization theories. ✓ Understand the relationship between the business management and the environment. ✓ Study the main economic functions of economic agents ✓ Understand and apply the fundamental principles of business management. ✓ Use the techniques necessary to carry out the main tasks of the manager (planning, organization, animation, control).	- Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	✓ Master the management functions: production, marketing, finance, human resources, research and development. ✓ Master strategic planning and forward-looking approach.	- Lecturing	Assignments, Quizzes, Exams,
S.5	✓ The interpretation of some indicators of business performance. ✓ Developing the forecasting approach.	- Lecturing	Assignments, 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%
3	First mid Term	8	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
- Blackboard
- Academic advisor
- Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	– Gerard Lelarge, « Organisation et gestion de l'entreprise », éditions Banque, paris, 1987. – Jean-Marie Peretti, « Gestion des Ressources humaines », édition Vuibert, Paris 1998(réédition en 2006). – Jean-Michel Plane, « Management des organisations », édition Dunod, Paris 2003. – Josse Roussel, « Economie et management de l'entreprise », édition l'Harmattan, Paris 2011. – Martine Reuzeau, « Economie d'entreprise : organisation, gestion, stratégie d'entreprise », éditions ESKA, Paris, 1993.
Essential References Materials	– Alain Beitone, Christine Dollo, Emmanuel Buisson et Emmanuel Le Masson, « Economie », éditions Dalloz, paris 2004. – C. Bialès, Rémi Leurion et autres, « Dictionnaire d'économie et des faits économiques et sociaux contemporains, édition Foucher, Paris, 1999. – Anne-Marie Bouvier, Dominique Lafleur, « Economie », édition Nathan, Paris, 2002. – Claude-Annie Duplat, « Analyser et maitriser la situation financière de son entreprise », édition Vuibert, Paris 2004. – Eric Bosserelle, « économie générale », éditions Hachette, Paris 2006.
Electronic Materials	- Lecture material in PPT - Any Related material including the YouTube videos relating to economics and business management. - Blackboard
Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022

Course Title:	**Supervised project I**
Course Code:	CSE161
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 (0-0-0-3)

2. Course type

a. University ☐ College ☐ Department ■ Others ☐

b. Required ■ Elective ☐

3. Level/year at which this course is offered: 1.1/3

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

5. Co-requisites for this course (if any)**:** Embedded System-Electrical, Basic Algorithms, Programming

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**	.....		
3	**E-learning**	.....		
4	**Distance learning**	.....		
5	**Other** (Project)	.....		

2. Contact Hours (based on academic semester)

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

B. Course Objectives and Learning Outcomes

Course Description

This Course will play an important role in developing the student's skills and knowledge in programming, providing them with the tools to apply them practically in the world of work. Thanks to this program, the student will be able to consolidate their academic background by putting it into practice in real contexts. In addition, this course will offer the student the opportunity to design and carry out a programming project, which will allow them to gain concrete experience while consolidating their understanding of theoretical concepts.

Course Main Objective

- Learn and apply the concepts of object-oriented programming to carry out a mini application project
- Implement an object-oriented programming code to create a mini application project and integrate the theoretical knowledge acquired in programming.
- Master how to produce documentation for a programming project. and manage the design problems related to programming

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	✓ Learn and apply the concepts of object-oriented programming to carry out a mini application project.	PLO.K1
2	**Skills**	
2.1	✓ Implement an object-oriented programming code to create a mini application project and integrate the theoretical knowledge acquired in programming.	PLO.S1
2.5	✓ Master how to produce documentation for a programming project. and manage the design problems related to programming	PLO.S5

C. Course Content

No	List of Topics	Contact Hours
1	Project 1. Block Chain	-
2	Project 2. Transport Company	-
3	Project 3. Public Transport	-
5	**Others** (specify)	
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**		
PLOK.1	✓ Learn and apply the concepts of object-oriented programming to carry out a mini application project.	- Class discussions - Assignments - Projects	Assignments, , Report, presentation
2.0	**Skills**		
PLOS.1	✓ Implement an object-oriented programming code to create a mini application project and integrate the theoretical knowledge acquired in programming	- Class discussions - Assignments - Projects	Assignments, Quizzes, report presentation,
PLO.S5	✓ Master how to produce documentation for a programming project. and manage the design problems related to programming		

2. Assessment Tasks for Students

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

Item	Resources
Accommodation	**Classroom board** **Computer lab with the necessary software** **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	11/10/2022