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

SEMESTER 4

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. Naziha DHIBI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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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: 4/3

4. Pre-requisites for this course (if any): CSE132, CSE232 , CSE222

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

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	Blended	45	100
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

1. Course Description

The design and development projects course is in the form of projects of which the ideas of the projects are proposed for each group and at each session the teacher monitors the progress of the design and implementation of each project.

2. Course Main Objective

- Understand the theoretical knowledge acquired in analysis and modeling by carrying out large-scale work in groups.
- Gain practical experience in implementing a methodology.
- Realization and documentation of an information system project.
- Step-by-step learning and use of a methodology to analyze and design systems.
- Practice of common software engineering working methods: presentations, revisions, etc.
- Mange the design problems and ethics related to the development of applications and projects
- Conclude effectively the basics, principles, and theories related to the development of applications and projects with other disciplines

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Step-by-step learning and use of a methodology to analyze and design systems.	K.1
2	**Skills**	
2.1	Realization and documentation of an information system project.	S.1
3	**Values**	
3.2	Conclude effectively the basics, principles, and theories related to the development of applications and projects with other disciplines	V.4

C. Course Content

No	List of Topics	Contact Hours
1	Project study	6
2	Writing of the specifications.	6
3	Project design	6
4	Production	9
5	Testing and maintenance	4
6	Demonstration of the final product,	4
7	Written report	4
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**		
K.1	Step-by-step learning and use of a methodology to analyze and design systems.	- Class discussions - Assignments - Projects	Assignments, Quizzes, Report,
2.0	**Skills**		
S.1	Realization and documentation of an information system project.	- Class discussions - Assignments - Projects	Assignments, Quizzes, presentation,
3.0	**Values**		
V.4	Conclude effectively the basics, principles, and theories related to the development of applications and projects with other disciplines		Assignments, Report, Quizzes, presentation

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2. **Assessment Tasks for Students**

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	90%
2	Quizzes, Homework assignments	Random	10%

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	
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.

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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	21/01/2022

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

Course Title:	Software Engineering II
Course Code:	CSE412
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Rim AFDHAL
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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Tunisian Republic
Private Higher School of Engineers of Gafsa
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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: 4/3

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

5. Co-requisites for this course (if any)**:** CSE132

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	-	-
2	**Blended**	45	100%
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**	22.5
4	**Others** (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

1. 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)

2. Course Main Objective

- Raise awareness of the interest of introducing the methods formalities in the development cycle of a software.
- 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
- Introduce formal verification techniques

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1. **Course Learning Outcomes**

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Demonstrate basics of software engineering.	K.1
2	**Skills**	
2.1	Master the concept of software life cycle, and compare some classic and newer development processes.	S.1
3	**Values**	
3.1	Mange the design problems and ethics related to software engineering.	V.4

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to formal methods	4
2	Need for formal methods	3
3	Formal methods and development cycle	3
4	Behaviour, environment, properties	3
5	Verification Techniques	4
6	Abstract machine concept	2
7	The clauses of an abstract machine Proof obligations	3
8	Definition and calculation of generalized substitutions Data modeling notation	3
9	The refinement process: Refinement proof obligations	4
10	Modularity	3
11	Kripke structure	4
12	Temporal logic: PLTL	3
13	Temporal logic: CTL	3
14	CTL model checking algorithm	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**		
K.1	Demonstrate basics of software engineering.	Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	Master the concept of software life cycle, and compare some classic and newer development processes.	Lecturing	Assignments, Quizzes, Exams,
3.0	**Values**		

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Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
V.3	Mange the design problems related to software engineering.	- 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	5%
3	First mid Term	9	30%
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
- Academic advisor
- Bibliotic

F. Learning Resources and Facilities
1. Learning Resources

Required Textbooks	- https://www.amazon.com/Software-Engineering-Specification-Languages-Theoretical/dp/3642059406
Essential References Materials	- https://www.sciencedirect.com/topics/computer-science/kripke-structure - https://tel.archives-ouvertes.fr/tel-01687290/document - https://www.atelierb.eu/methode-formelle/raffinement-automatique/ - http://pagesperso.lina.univ-nantes.fr/~andre-p/download/introMF.pdf
Electronic Materials	- Lecture material in PPT - Any Related material including the YouTube videos relating to engineering measurement - Blackboard
Other Learning Materials	- NA

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2. **Facilities Required**

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.

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	01/09/2021

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Tunisian Republic
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Course Title:	Database management systems
Course Code:	CSE421
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Fadhel SAAD
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

Tunisian Republic
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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: 4/3

4. Pre-requisites for this course (if any): CSE322, CSE131

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

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	Blended	45	100
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	22.5
4	Others (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

This document is a support for lessons and exercises for teaching the Database Management System module.

It is aimed at second-year engineering students in computer science. The support presents the concepts of the PL/SQL language and emphasizes the specificities of this language compared to the SQL language. Examples summarizing the notions introduced are presented in each chapter. At the end of this course, the student must master the PL/SQL language and use stored processes and triggers in applications.

2. Course Main Objective

Main objectives were set for database management systems from the outset, in order to solve the problems caused by the traditional approach. These objectives are:

-   Understand the place of PL/SQL in application architectures.
-   Acquire mastery of the PL/SQL language.
-   Know the standard functions and packages.
-   Know how to write stored procedures and packages.
-   Master the philosophy and syntax of triggers.

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Understand all the concepts underlying databases and DBMS.	K.1
2	**Skills**	
2.2	Master the functional architecture of the Oracle DBMS Develop functions and programs in PL/SQL language and manage PL/SQL programs in packages	S.2
3	**Values**	
3.1	be able to write database-oriented programs using PL/SQL as the language and this in one of the industrial cases	V.4

C. Course Content

No	List of Topics	Contact Hours
1	I- Chapter 1: Introduction to DBMS and PLSQL	5
2	II- Chapter 2: Control structures (PLSQL)	6
3	III- Chapter3: Interaction with Oracle and explicit cursors	8
4	IV- Chapter 4: Exception management	7
5	V- Chapter 5: Sub-programs	6
6	VI- Chapter 6: Stored subroutines and packages	4
7	VII- Chapter 7: Triggers	9
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.1	Understand all the concepts underlying databases and DBMS.	Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	Master the functional architecture of the Oracle DBMS. Develop functions and programs in PL/SQL language and manage PL/SQL programs in packages.	Lecturing	Assignments, Quizzes, Exams,
3.0	**Values**		
V.4	be able to choose and implement a database management system	- Lectures - Class discussions - Assignments - projects	Assignments, Report, Quizzes, Exams

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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	5%
3	First mid Term	7	15%
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:

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- M.T.Öszu, P. Valduriez : Principles of Distributed Database Systems, 2nd edition, Prentice Hall, 1999. - R. Ramakrishnan: Database Management Systems, Mc-Graw Hill, 1997 - H. Garcia-Molina, J.D.Ullman, J. Widom : Database System Implementation, Prentice Hall, 2000 - Mohamed Fadhel SAAD: PL/SQL sous Oracle 12cGuide du DÉVELOPPEUR, EDITIONS eni 2016.
Essential References Materials	- Gardarin G., Maîtriser les Bases de Données: modèles et langages, Eyrolles, 1998. - Carrez C., Des Structures aux Bases de Données, Masson, 1990. - Miranda S.M. & Busta J.M., L'Art des Bases de Données, Eyrolles, 1990 - Allen G. T., SQL pur les nuls, First, 2010.
Electronic Materials	- Lecture material in PPT - Any Related material including the YouTube videos relating to engineering measurement - Blackboard
Other Learning Materials	- NA

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2. **Facilities Required**

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.

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	12/02/2022

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

Course Title:	Introduction to Embedded Systems
Course Code:	CSE422
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Wajdi SAADAOUI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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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: 4/3

4. Pre-requisites for this course (if any): CSE311, CSE242

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

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	-	-
2	**Blended**	45	100
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**	22.5
4	**Others** (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

This course is mainly focused on the software/hardware aspect of embedded systems in order to rely on the computer science knowledge (both software and architectural) of the student engineer. From the electronic point of view, the emphasis is on the system aspect and more particularly on systems on chips (System-On-Chip: SoC).

2. Course Main Objective

The course objectives are:
- Introduction: What is an embedded system? What is embedded?
- Main characteristics of an embedded system
- Time constraints and embedded systems services and different name resolution techniques.

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Good knowledge of Linux and Windows, networks under IP and tools for debugging, compilation, system-on-chip simulation,	K.1
2	**Skills**	
2.1	Master embedded architectures and master CAD tools (e.g. Cadence, Synopsys, Mentor etc.) and simulation tools	S.1
3	**Values**	
3.1	Use skills and knowledge to provide solutions to many different industries (working life).	V.1

C. Course Content

No	List of Topics	Contact Hours
1	I- Introduction to embedded systems and SoCs	6
2	II- Microcontroller architecture and their programming	6
3	III- Inter-chip communication	6
4	IV- SoC: bus and Network-On-Chip architectures	6
5	V- Operating and real-time systems	6
6	VI- Cross-compilation and constraints of an operating system on embedded	6
7	VII- Example of application: wireless sensor network	9
8	I- Introduction to embedded systems and SoCs	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.1	Good knowledge of Linux and Windows, networks under IP and tools for debugging, compilation, system-on-chip simulation,	Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	Master embedded architectures and master CAD tools (e.g. Cadence, Synopsys, Mentor etc.) and simulation tools.	Lecturing	Assignments, Report, Quizzes, Exams
3.0	**Values**		
V.1	Use skills and knowledge to provide solutions to many different industries.	- Lectures - Class discussions - Assignments - projects	Assignments, Report, Quizzes, Exams

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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	5%
3	First mid Term	7	15%
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	- Patrick Kadionik, http://kadionik.developpez.com/, Systèmes embarqués (ENSEIRB) - Andreas Savvide, Yale, EE460A, Networked Embedded Systems and Sensor Networks
Essential References Materials	
Electronic Materials	- Lecture material in PPT - PC - Switch - Router - Any Related material including the YouTube videos relating to LAN - Blackboard
Other Learning Materials	- NA

2. **Facilities Required**

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.

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G. Course Quality Evaluation

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

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	22/03/2022

Tunisian Republic
Private Higher School of Engineers of Gafsa
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Course Title:	Operational research
Course Code:	CSE431
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Naziha DHIBI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

Tunisian Republic
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A. Course Identification

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

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 4/3

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	Percentage
1	Traditional classroom	-	-
2	Blended	22	100
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	45

B. Course Objectives and Learning Outcomes

1. Course Description

The course " Operational research " covers the basic notions and concepts of operational research, the employability of operational research is made up of two concatenated phases, the first of which consists in mathematically formulating a problem which requires a detailed and sufficiently precise analysis to collect the essential characteristics of the problem posed in addition to know-how and some experience. In the second phase, the problem is solved by the use of rigorous and well-defined algorithms.

2. Course Main Objective

- State and relate basics concepts of operational research, fundamental algorithms on operational research, and their applications
- Master collection of data and information provided by the problem.
- Learn how to formulate optimization models.
- Present the different steps to follow to give a global mathematical vision.
- Learn how to present the different problem-solving techniques whose goal is to find the best solution (called optimal solution) for the problem studied.
- Mange the design problems and ethics related to operational research.
- Conclude effectively the basics, principles, and theories related to operational research

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3. Course Learning Outcomes

	CLOs		Aligned PLOs
1	**Knowledge and Understanding**		
1.1	State and relate basics concepts of operational research, fundamental algorithms on operational research, and their applications		K.2
2	**Skills**		
2.1	Apply the knowledge of operational research and concepts to produce solutions and designs whose goal is to find the best solution (called optimal solution) for the problem studied.		S.2
3	**Values**		
3.1	Customize the use of technical and scientific operational research tools in Computer science engineering practices		V.2
3.2	Conclude effectively the basics, principles, and theories related to operational research with other disciplines		V.4

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Optimization	1
2	Definition of Operations Research	2
3	Formulation of an optimization problem	2
4	Linear programming	2
5	Solving linear programs	2
6	Graphics resolution	1.5
7	Simplex Method: Solving by Simplex Tables	2
8	Duality	2
9	MidTerm-1	2
10	Linear problems in integer variables	2
11	Dynamic Programming	2
12	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.2	State and relate basics concepts of operational research, fundamental algorithms on operational research, and their applications graphs, and their applications	Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	Apply the knowledge of operational research and concepts to produce solutions and designs whose	Lecturing	Assignments, Quizzes, Exams,

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Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	goal is to find the best solution (called optimal solution) for the problem studied		
3.0	**Values**		
V.2	Customize the use of technical and scientific operational research tools in Computer science engineering practices		Assignments, Quizzes, Exams,
V.4	Conclude effectively the basics, principles, and theories related to operational research with other disciplines		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	5%
3	First mid Term	9	30%
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
- Academic advisor
- Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- F. Bastin Operational Research Models Department of Computer Science and Operational Research University of Montreal 2010.
Essential References Materials	- C. Prins and M. Sevaux - Linear programming with Excel: 55 optimization problems modeled step by step and solved with Excel, Eyrolles, 2011.. - 2. B. Fortz Operational research and applications 2012-2013. - 3. J.C Hennet, Operational Research course 2012.
Electronic Materials	- Lecture material in PPT - Any Related material including the YouTube videos relating to engineering measurement - Blackboard
Other Learning Materials	- NA

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2. **Facilities Required**

Item	Resources	
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.	
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show	
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.	

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	18/03/2022

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Tunisian Republic
Private Higher School of Engineers of Gafsa
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Course Title:	Business creation and systems management
Course Code:	CSE432
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Elkamel GHRISSI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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Private Higher School of Engineers of Gafsa
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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:	4/3
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	Percentage
1	Traditional classroom	-	-
2	Blended	45	100
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

1. Course Description

The creation of a company and management of systems 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.

2. Course Main Objective

The course aims to give students the basics of knowledge related to entrepreneurship and the Business Plan

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	What is a business and a company What is an economic structure	K.2
2	**Skills**	
2.2	Have a business address book	S.2

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CLOs		Aligned PLOs
	Have a leader's mind	
3	**Values**	
3.1	Not risk averse Sociable Visionary	V.3
3.4	Have a sense of communication and convince	V.4

C. Course Content

No	List of Topics	Contact Hours
1. From idea to project	1. Have an idea 2. Assess the opportunity 3. The Business Plan 4. Financial forecasts	12
2. Define your position	1. Define your market 2. Segmentation 3. Prioritize segments 4. The marketing and sales plan	12
3. Structure and mode of operation	1. Structure and organization 2. Business model 3. Legal and financial aspects	12
4. From analysis to a successful start	1. Risk identification and management 2. The business creation market	09
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	Demonstrate basics of economics and organization theories	Lecturing	Assignments, Quizzes, Exams,
2.0	**Skills**		
S.2	Apply financial indicators	Lecturing	Assignments, Quizzes, Exams,
3.0	**Values**		
V.1	Mastering the organization and operation of companies	- Lectures - Class discussions - Assignments	Assignments, Quizzes, Exams,

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Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
V.4	Persuade, present, communicate, supervise and lead effectively topics in Computer science engineering and other related disciplines	Debate, whole group and small group work, discussion and research activities, lab ,demonstrations, projects roleplaying, individual	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	0%
3	First mid Term	9	20%
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:

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	
Essential References Materials	
Electronic Materials	- Lecture material in PPT - Blackboard
Other Learning Materials	- NA

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources	Traditional Machine shop, Metrology Lab.

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Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

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	03/03/2022

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

Course Title:	English IV: Media and Culture
Course Code:	LAC441
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Mrs. Rim RADDADI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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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: 4/3

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

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

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	Blended	22.5	100
3	E-learning	---	----
4	Distance learning	---	----
5	Other	---	----

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	45
2	Laboratory/Studio	22.5
3	Tutorial	-
4	Others (specify)	-
	Total	67.5

B. Course Objectives and Learning Outcomes

1. Course Description

This course would help the learner use what they acquired during their previous academic years and practice them in English.

It would also cover some grammatical points in structure that would help the learner communicate effectively and write consistency and coherently.

2. CourseMain Objective

- Talk in write about computer application
- Learn how to summarize a written text.
- Learn about the features of graphical user interface.
- Practice and use some grammatical points

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Knowledge of computer components and computer system	K.1
1.2	Being aware of computer and system problem	K.3

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2	Skills	
2.1	Apply the acquired knowledge to understand a given text, a figure, a statistic or a chart in order to identify computer or system problems.	S.1
2.2	To be able to deal with a business situation.	S.2
3	Values	
3.1	Be able to solve computer problems	V.1
3.2	Lead an effective written or oral business conversation.	V.4

C. Course Content

No	List of Topics	Contact Hours
1	Unit one: Functions and applications	4
2	Unit two: computers today	5.5
3	Unit three: input and output devices	1.5
4	Unit four: storage devices	6
5	Unit five: Basic software	5.5
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	Identifying computer components and different computer system	-Pair or group work. - Activities - Games.	-Assignments. - Peer to peer evaluation.
K.3	Locate a computer related problem		
2.0	**Skills**		
S.2	Apply the acquired knowledge to understand a given text, a figure, a statistic or a chart in order to identify computer or system problems.	Activities	Assignments, Quizzes, Exams,
3.0	**Values**		
V.4	Communicate effectively while discussing topics around computer. science	- 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	25%
2	Quizzes, Homework assignments	Random	10%
3	Second mid Term	-	15%
4	Final Exam	16	65%

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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	- S. R. Esteras, English for computer users: Cambridge university press.
Essential References Materials	- S. R. Esteras, English for computer users: Cambridge university press.
Electronic Materials	- You tube videos
Other Learning Materials	- NA

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) **teaching class room with board and internet access. Computer Lab.**
Technology Resources (AV, data show, Smart Board, software, etc.)	**Power point data show**
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	**Traditional Machine shop, Metrology Lab.**

G. Course Quality Evaluation

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

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H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	09/03/2022

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

Course Title:	French II: General communication 2
Course Code:	LAC442
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Mrs. Houda HINCHRI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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

A. Course Identification

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

2. Course type
a. College ☐ Department ■ Others ☐
b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 4/3

4. Pre-requisites for this course (if any): LAC252.

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

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	Blended	22.5	100
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

1. Course Description

In this semester, the learning of this subject "communication in French" necessarily takes on a dimension of practice and deepening which will enable the student to master new skills.

In other words, the student must know how to deal with various communication situations that he/she will encounter in the working world.

2. Course Main Objective

The student should therefore be able to:

- Understand specific communication situations: work meetings, project presentations
- Understand professional reports, notes, specifications request information
- Draw attention to a given fact, inform about the progress of a project, conduct a meeting and/or an interview

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	knowledge of organizational communication 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.	K.1
2	**Skills**	
2.1	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.	S.2
3	**Values**	
3.1	- Acquire the necessary skills to enter professional life. -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 correction of the S1 exam.	2
2	The internship report: Definition, steps and mistakes to avoid.	2,5
3	The PV and the file of an internship.	3
4	Professional writings and the application file.	3
5	Speaking (oral presentations...) and conducting meetings (preparation, evaluation and conflict management...)	2,5
6	Audio-visual session: videos to watch and comment on (Interviews for internships, how to write a good internship report, a cover letter for internships, producing a professional e-mail with different techniques...)	3,5
7	Preparation for the Delf B2 and a placement test	3,5
8	Pre-examination debriefing	1
9	Main review	1,5
	Total	22,5

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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	Knowledge of organizational 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 Tutorials Courses project	Assignments, Quizzes, Exams,
3.0	**Values**		
V.4	Acquire the necessary skills to enter professional life. 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	15%
2	Quizzes, Homework assignments	Random	20%
3	First mid Term	-	00%
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

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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

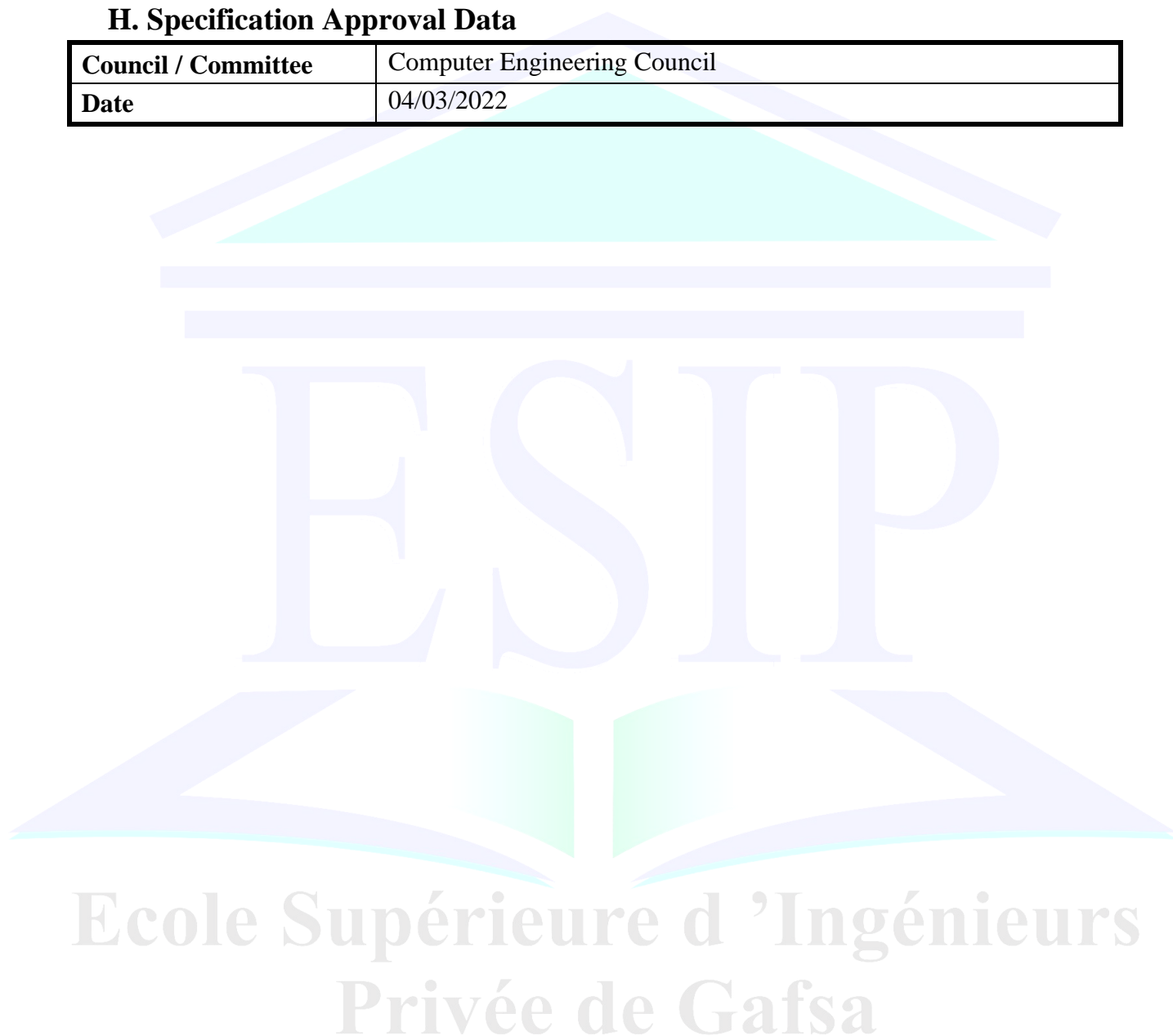| Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.

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

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

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	04/03/2022

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

Course Title:	Fonction Programming
Course Code:	CSE451/1
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Mr. Ahmed KLIFI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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A. Course Identification

1. Credit hours:	03 (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: 4/3

4. Pre-requisites for this course (if any): LAC151

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

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	-	-
2	**Blended**	45	100
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	22.5

B. Course Objectives and Learning Outcomes

1. Course Description

The first part of the course provides fundamental knowledge of the Java and Python programming languages and more generally functional programming.

The aim of this part is rather to introduce a number of key ideas about functional programming, as well as to dismantle other misconceptions about it.

Concepts to be covered include quality, modularity, functional design, recursive and iterative processes, atomic objects, lists and higher order abstraction.

The second part of the course is devoted to the execution model of a functional program, the application of functional programming (non-mutable data structure, stream programming, pattern matching.).

The last part of this course describes the advantages and disadvantages of functional programming.

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2. Course Main Objective	

- Learning a number of programming methods and techniques of programming:
- symbolic, functional
- imperative, object, macros
- Know how to write applications:
- maintainable, reusable,
- readable, modular,
- general, elegant.
- Learn the aspects of functional programming:
- Extreme efficiency
- Real-time.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.2	Understanding the basic principles, concepts and theories related to functional programming.	K.2
2	**Skills**	
2.3	Apply the principles and concepts of functional programming to produce solutions that meet specific needs.	S.2
2.4	Design, develop, analyze and evaluate practices, projects and experiences related to functional programming practices, projects and experiences.	S.3
3	**Values**	
3.2	Justify standards and codes in the practice of functional programming.	V.2
3.4	Effectively persuade, present, communicate, supervise and direct functional programming topics.	V.4

C. Course Content

No	List of Topics	Contact Hours
1	Brief history and context of functional programming.	5
2	Founding principles (composition of functions, variables in the mathematical sense, property of referential transparency, purity), con	5
3	Edge effect, immutable reference and expression evaluation.	5
4	Pattern matching.	5
5	Functions as argument and return value.	5
6	Argument evaluation strategies.	5
7	Polymorphism and type deduction.	5
8	Closures, currying and partial application.	5
9	Higher order functions (map, reduce/fold, filter). Concurrency and parallelism in functional programming.	5
Total		45

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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	Understanding the basic principles, concepts and theories related to functional programming.	Lecturing	Assignments, Quizzes, homework
2.0	**Skills**		
S.2	Apply the principles and concepts of functional programming to produce solutions that meet specific needs.	Lecturing Laboratory/Studio Course project Assignment work	Assignments, Report, Quizzes, Exams,
S.3	Design, develop, analyze and evaluate practices, projects and experiences related to functional programming practices, projects and experiences.		Assignments, Report, Quizzes, Exams,
3.0	**Values**		
V.2	Justify standards and codes in the practice of functional programming.	Lecturing Laboratory/Studio Course project Assignment work projects	Assignments, Report, Quizzes, Exams
V.4	Effectively persuade, present, communicate, supervise and direct functional programming topics.		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	5%
3	First mid Term	8	15%
4	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:

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

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F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- VR Convington, M.A., Nute, D. & Vellino, A. – Prolog Programmin in Depth – Prentice-Hall, 516P., 1997. - VC Bird, R. – Introduction to Functional Programming using Haskell – Prentice-Hall PRESS, 460 P. (2nd edition).
Essential References Materials	- VC Field, A.J., Harrison, P.G. – Functional Programming, International Computer Science – Workingham G.B. : AddisonWesley, 602 P., 1988.
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 (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

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	11/03/2022

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:	LAC352
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. TLIJANI Hayet
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

Ecole Supérieure d 'Ingénieurs
Privée de Gafsa

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

A. Course Identification

1. Credit hours:	03 (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: 4/3
4. Pre-requisites for this course (if any): LAC351
5. Co-requisites for this course (if any)**:**

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	-	-
2	**Blended**	45	100
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

1. Course Description

The software architecture describes in a symbolic and schematic way the different elements of one or more computer systems, their interrelationships and their interactions.

Unlike the specifications produced by the functional analysis, the architecture model, produced during the design phase, does not describe what a computer system must achieve but rather how it must be designed in order to meet the specifications. Analysis describes the "what to do" while architecture describes the "how to do it".

This course aims at the student to acquire skills in the architectural design of distributed software applications.

2. Course Main Objective

The objective of this course is to present the main GoF design patterns describing proven solutions to solve software architecture problems.

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Understand software architectures and their components.	K.1
1.2	Understand the main Design Patterns and be able to implement them.	K.2
2	**Skills**	
2.1	Measure and maintain the quality of software design and architecture.	S.2
2.2	Explore and practice distributed software design in real-world cases	S.3
3	**Values**	
3.1	Use software architecture to facilitate the development, evolution, deployment and maintenance of a system. Minimize intervention time and cost.	V.2
3.2	The ability to make any addition or modification simple and quick to any application	V.4

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Architectural Design • Architecture concept • Software architecture style • Architectural modeling of software	11
2	Architectural Models and Frameworks • Types of Frameworks • Component Oriented Architectures • Model Driven Architectures • Service Oriented Architectures • Aspect-Oriented Architectures	12
3	Design patterns of the Gang of Four • The creative patterns • The structural patterns • Behavioral Patterns	12
4	Other Design patterns • GRASP patterns • Company patterns • The other patterns	10
Total		45

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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	Understand software architectures and their components.	-Pair or group work. - Activities - Games.	-Assignments. - Peer to peer evaluation.
K.3	Understand the main Design Patterns and be able to implement them.		
2.0	**Skills**		
S.2	Measure and maintain the quality of software design and architecture.	Activities	Assignments, Quizzes, Exams,
S.3	Explore and practice distributed software design in real-world cases		
3.0	**Values**		
V.2	Use software architecture to facilitate the development, evolution, deployment and maintenance of a system. Minimize intervention time and cost.	- Lectures - Class discussions - Assignments - projects	Assignments, Report, Quizzes, Exams
V.4	Supervision and leadership of software design projects related to computer engineering and other disciplines		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	25%
2	Quizzes, Report & assignments	Random	00%
3	First mid Term	-	00%
4	Second 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:

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

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F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- Jacques Printz Préface de Yves Caseau, « Architecture Logicielle : Concevoir des applications simples, sûres et adaptables », Dunod, Paris, 2006 - R. KAZMAN et al « Software Architecture in Practice », 3ème édition -
Essential References Materials	-
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 (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Traditional Machine shop, Metrology Lab.

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	08/03/2022

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Course Title:	Computer Networking / Mini Project
Course Code:	CSE461/1 CSE462/1
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Mr. Mounir TELLI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

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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: 4/3

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	Percentage
1	Traditional classroom	-	-
2	Blended	45	100
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 (Mini Project)	22.5
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

This lecture and laboratory course introduces the fundamental properties of data transmission and computer networks. Topics include: data transfer, the OSI and TCP/IP models, protocols, WAN and LAN topologies, devices and media, security and troubleshooting. This course provides basic background for other networking courses and industry certifications.

2. Course Main Objective

- Explain the OSI (Open Standards Interface) and TCP/IP (Transmission Control Protocol/Internet Protocol) models and how they define data transmission;
- Describe and configure important network protocols and implement logical addressing schemes;
- Configure, maintain, and troubleshoot network connectivity devices and transmission media;
- Implement network architecture with basic network security, including encryption;
- Explain the scientific method of analysis and apply it in a variety of situations to solve networking problems, including data transmissions errors, hardware faults, malware, and configuration errors [Scientific Literacy];

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Standards and the OSI and TCP/IP Models	K.1
1.2	Addressing, Transmission and Media, Topologies, Routing and Switching	K.2
1.3	Network Design, Implementation and Maintenance	K.3
2	**Skills**	
2.1	Employ knowledge, principles and concepts of advanced The OSI model and the TCP/IP model	S.1
2.2	Walk through the essentials of an IP address and then take a deep dive into subnetting IPv4 networks into smaller networks,.	S.2
2.3	Know that there are two major categories of transmission media, namely guided and wireless (or unguided) and take a walk through the types of transmission media and connectors	S.3
2.4	Explore architectural concepts, including wired and wireless topologies, network types, Build the foundation of networking technologies, Install, configure network switches and network routers, Plan, implement, secure, maintain, and troubleshoot converged enterprise networks, Implement IP routing and switching, Maintain and troubleshoot IP networks	S.4
3	**Values**	
3.1	OSI model prescribes the steps needed to transfer data over a network and it is very specific in it, defining which protocol is used at each layer and how. The TCP/IP model is not that specific. It can be said that the OSI model prescribes, and TCP/IP model describes.	V.1
3.2	Conclude that network addressing provides mechanism to differentiate between hosts and network.	V.2
3.3	Transmission media are necessary to form a computer network, as they are the physical paths between a transmitter and a receiver. Network architecture is the complete framework of a computer network Routing & switching is the basis for any hardware & network. It is the process of selecting the best path to share data across network.	V.3
3.4	Network design includes things like network analysis, IP addressing, hardware selection, and implementation planning.	V.4

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C. Course Content

No	List of Topics	Contact Hours
1	Chapter I:	7.5
	1- Introduction to Computer Network	3
	2- Transmission techniques in the network	4.5
2	Chapter II:	13.5
	1- Fundamentals of networks	3
	2- Elements of computer network	4.5
	3- Concept and capacity of a network system	3
	4- Study of the performances in the network	3
3	Chapter III : Peer-To-Peer (P2P) Networks for File-Sharing	9
	Total	30

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	Aware with basics, principles, and theories related to Computer network	- Lectures - Class discussions - Assignments	Assignments, Quizzes , Exams,
K.3	Explore Computer network contemporary issues constraints to judge and reach the optimum solutions.		
2.0	**Skills**		
S.2	Apply the knowledge of Computer network principles and concepts to produce solutions and designs that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	- Lectures - Class discussions - Assignments	Assignments, Quizzes , Exams, Assignments, Report, Quizzes , Exams,
S.4	Evaluate and analyze the performance and sustainability of designed and/or existing Computer science systems.		
3.0	**Values**		
V.1	Ability to use computer facilities to resolve Computer network problems	- Lectures - Class discussions - Assignments - projects	Assignments, Report, Quizzes , Exams
V.3	Justify the standards and codes in practice of design and analysis of Computer network problems and ethics		Assignments, Report, Quizzes , Exams

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2. Assessment Tasks for Students

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3	First mid Term	-	00%
4	Second 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:

- Office hours
- Blackboard interface
- Academic advisor
- Bibliotic

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- SMB University: Selling Cisco SMB Foundation Solutions - Networking Fundamentals
Essential References Materials	- " COMPUTER NETWORK", SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN. -
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 (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) teaching class room with board and internet access. Computer Lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Power point data show
Other Resources	Traditional Machine shop, Metrology Lab.

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Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

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	08/03/2022