COURSE Syllabus

Course Name: Analysis & Measurement of Wind Speed & Types

Course Number: 0408332 + 04083261

General Information and Course Details:

Course title	Analysis & Measurement of Wind Speed & Types
Course number	0408332 + 04083261
Credit hours (theory, practical)	3h (theory)
Contact hours (theory, practical)	3h in three times weekly
Prerequisites/corequisites	0408303 Fluid Mechanics + 0408211 Dynamics & Vibrations
Program title	Renewable Energy Engineering
Program code	REE
Awarding institution	Isra University
Faculty	Faculty of Engineering
Department	Renewable Energy Engineering Department
Level of course	Third year
Year of study and semester (s)	2022/2023 1st Semester
Final Qualification	B.Sc.
Other department (s) involved in teaching the course	None
Language of Instruction	English & Arabic
Date of production/revision	2022

Course Coordinator:

Office No.: 4309

Office Hours: Sun: 11:00 – 12:00

Email: mohanad.alghriybah@iu.edu.jo

Other Instructors:

Office No.:

Email:

Office Hours:

Course Description:

Introduction the general characteristics of the wind resource. Historical uses of wind resources. The Earth's wind systems. Mechanics of wind motion. atmospheric circulation patterns and its variation with time. Available wind power. Measurement of wind speed. Statistical analysis of the wind energy and wind energy assessments using Weibull distribution function

Text Book: *Author(s), Title, Publisher, Edition, Year, Book website.*

James Manwell · wind energy explained: theory, design and application, 2nd edition

Gary L. Johnson, WIND ENERGY SYSTEMS, 2006

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

Required book (s), assigned reading and audio-visuals:

1. Wind Energy-Fundamentals, Resource Analysis and Economics, Sathyajith Mathew, Springer-Verlag Berlin Heidelberg Copyright © 2006 - ISBN : 978-3-540-30905-5..

2. David Wood, Green Energy & Technology - Small Wind Turbines- Analysis, Design, and Application, 1st Edition , Springer-Verlag London Limited Copyright © (2011) - ISBN 978-1-84996-174-5

Course Educational Objectives (CEO):

1.	Describe characteristics of the wind resource.
2.	Identify mechanics of wind motion.
3.	Describe the components of the wind machines and there power curves
4.	Identify the Wind Measurements and their working principles.
5.	Assess the wind potential resources at sites using Weibull distribution.

Intended Learning Outcomes (ILO's):

After successful completion of this course, you should be able to: Intending Learning Outcomes (ILO's)		**Relationship to CEO**	**Contribution in Program PLOs**
A	**Knowledge and Understanding**		
A1	Identify the general characteristics of the wind	1+2	1+2
A2	Describe the factors that affect the motion of wind.	1+2	1+2
A3	Describe wind speed and direction measurements, the principle of work, and the development of wind measurement	3+4	1+2
B	**Intellectual skills**		
B1	Define the relation between the variations of wind speed with elevation	3+4+5	1+2
B2	Calculate the spacing for wind farms and weak effect	3+4+5	1+2
C	**Subject specific skills**		

C1	Assess wind potential (power and energy density) using statistical method.	3+4+5	1+2

Topic Outline and Schedule:

Topic	**Weeks**	**Achieved ILOs**
Wind resource: global origins.	**2 weeks**	**A1+A2+A3**
Mechanics of wind motion	**2 week**	**A1+A2+A3+B1**
Variations with elevation, time, and site	**2 weeks**	**A3+B1+B2**
Available wind power	**2 weeks**	**A1+A2+A3+B1+B2**
characteristic of the atmospheric boundary layer	**2 weeks**	**A1+A2+A3+B1+B2**
Wind speed Measurements	**2 weeks**	**A1+A2+A3+B1+B2**
Wind direction Measurements	**1weeks**	**A1+A2+A3+B1+B2**
Weibull wind function distribution	**2 weeks**	**A1+A2+A3+B1+B2+C1**
Final exam	**16th**	

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

Lectures

Lab hands on

Lab hands on & on line

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT teaching for notes, references communication with students.**
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, Quizzes, laboratory practice, fieldwork, YouTube videos, study and analysis of bibliography, tutorials, art workshop, interactive teaching, educational visits, project, essay writing, etc.*	• Online exams (Mid + Final) • Videos • Homework including analysis of Of some engineering problems • Projects

Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Attendance
Students should attend every class meeting for the entire course period. If you miss class, it is your responsibility to obtain announcements and assignments.
How to success – ***Active s haring and cooperation, on time, prepared.***

Grading Policy:

1. **Midterm** **30%**
2. **Assignments and technical reports** **20%**
3. **Final Examination** **50%**

Academic Assistance

- Homework is due to the beginning of class on the due date.
- At least one project during the term.
- Any potential conflicts have to be discussed before the exam dates.
- Quizzes in-class will be given and there will be no make-up quizzes.
- Final Exam (50%).
- Copying of assignments or other means of duplicating materials that is turned for grading is **forbidden.**
- Cheating on exams will result in a zero grade for the exam or the whole course.

At any point in the semester, if you encounter difficulty with the course or feel you could be performing at a higher level, consult with me.

Academic support for Students with Disabilities – Students who may need assistance due to a disability are encouraged to ask for a support.

Course Policies:

A- Attendance policies:
15% of 48 lecturing hours
B- Absences from exams and handing in assignments on time:
Exam can retake based on approval of excuse from dean
Not handing assignment on time will result in zero mark
C- Health and safety procedures: NA
D- Honesty policy regarding cheating, plagiarism, misbehavior:
Cheating, plagiarism, misbehavior may result in zero grade
E- Grading policy:
- All homeworks are posted on line
- All quizzes and exams are provided with solution for perfect score

F- Available university services that support achievement in the course: Labs, Software, Simulation programs

Required equipment:

Labs: None

Software:

Hardware: Later on.

Assessment Plan for the Course Learning Outcome (just select):

- ■ Midterm Online Exam.
- ■ Final Online Exam.
- ■ Quizzes.
- ■ Written Reports.
- ■ Homework.

- Term Projects.
- Case Study.
- Participation in Lecture.
- Illustrative Presentations.
- Oral Exams.
- Others (identify): Active attendance and on-time.

Program Learning Outcomes (PLOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Responsible Persons and their Signatures:

Course Coordinator	**Dr. Mohanad Al-Ghriybah**	**Completed Date**	29 / 6 / 2022
		Signature	
Received by (Department Head)		**Received Date**	/ /
		Signature	