**Ministry Of Higher Education and Scientific Research**

**AL-Mustansaria University/College of Science/Department of Computer Science**

**(الخطة الدراسية للمساق )**

***Course Plan***

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| **Course No.:** | | **Course Name: Wind Energy Meteorology** |
| **Academic Year:   2020-2021** | | **Time Division: 2hr Theoretical** |
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**Course Description :**

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| **This course deals with the subjects that take the physical and applied side of the wind ‎energy, especially the relationship between the atmosphere and wind energy. Study the atmospheric Motions, Forces, Wind Resource and Wind Measurements.**  **Course Intended Outcomes :** |
| At the end of the course, students are expected to learn:   * what is the Wind Energy. * The interaction of Wind Radiation with Atmosphere . * what is the Wind Measurements‎. * Wind energy applications & Uses. |

# Course Outline:

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| **Week** | **Description depends on the Timing table** |
| **1** | **Introduction:** Wind Energy Conversion Paths |
| **2** | **Origin of Atmospheric Motions:** Available Potential Energy, Heat Balance of the Atmosphere. |
| **3** | **Physical Principles of Atmospheric Motion:** Forces Acting on an Air Parcel: Static State, Differences in Air Pressure.‎ . |
| **4** | **Fundamental Forces:** Forces for Vertical Air Motions.‎ |
| **5** | **Fundamental Forces:** Forces for Horizontal Air Motion: Horizontal Pressure Gradient Force, Coriolis force, Friction Force. |
| **6** | **Fundamental Forces:** Equation of Motion. |
| **7** | **Fundamental Forces: ‎** Balances of the Horizontal Wind Field: Geostrophic Balance, Friction Wind. |
| **8** | **First Exam** |
| **9** | **Wind Climatology:** Local Winds**,** General Circulation of the Atmosphere**,** Wind Resources. |
| **10** | **Wind Flow in the Atmospheric Boundary Layer:** Boundary Layer Height |
| **11** | **Vertical Structure of the Boundary Layer:** The Surface Layer**,** The Ekman Layer. |
| **12** | **Wind Resource Assessment:** The European Wind Atlas: Overview and Basic Concepts, Physical Models, Application of the Model. |
| **13** | **Wind Resource Assessment:** Resource Assessment in Complex Terrain - Mesoscale Modeling. |
| **14** | **Wind Measurements** |
| **15** | **Second Exam** |

**Textbooks:**

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| 1. Wind energy explained: theory, design and application”, by F. Manwell, J.G. McGowan and A.L. Rogers, Joh Wiley and Sons, LTD, 2002. |

**Suggested references:**

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| 1. Wind Energy, Energy Revolution Series, M. M. Eboch, Raintree, 2020.   <https://books.google.iq/books?id=utl8DwAAQBAJ&pg=PA2&dq=%E2%80%8E1-%E2%80%8E%09Wind+Energy,+Energy+Revolution+Series&hl=ar&sa=X&ved=2ahUKEwjL4NizgIrwAhUzgf0HHZgKCDoQ6wEwAHoECAMQAQ#v=onepage&q=%E2%80%8E1-%E2%80%8E%09Wind%20Energy%2C%20Energy%20Revolution%20Series&f=false>   1. Assessing the Efficiency and Effectiveness of Wind Energy Incentives, Hearing Before the Subcommittee on Oversight Joint with the Subcommittee on Energy, Committee on Science, Space, and Technology, House of Representatives, One Hundred Thirteenth Congress, First Session, Tuesday, April 16, 2013.   <https://books.google.iq/books?id=EtFGAQAAMAAJ&pg=PA84&dq=%E2%80%8E2-%E2%80%8E%09Assessing+the+Efficiency+and+Effectiveness+of+Wind+Energy+Incentives&hl=ar&sa=X&ved=2ahUKEwjovcKYgIrwAhVA_rsIHfuDAB0Q6wEwAHoECAIQAQ#v=onepage&q=%E2%80%8E2-%E2%80%8E%09Assessing%20the%20Efficiency%20and%20Effectiveness%20of%20Wind%20Energy%20Incentives&f=false>   1. Wind Energy Explained, James F. Manwell, Jon G. McGowan, Anthony L. Rogers, 2010.   <https://books.google.iq/books?id=roaTx_Of0vAC&printsec=frontcover&dq=%E2%80%8E%09Wind+Energy+Explained&hl=ar&sa=X&ved=2ahUKEwj1l57o_4nwAhXXhP0HHZqjBv4Q6wEwAHoECAAQAQ#v=onepage&q=%E2%80%8E%09Wind%20Energy%20Explained&f=false>   1. Wind Energy, Renewable Energy and the Environment, Second Edition, Vaughn Nelson, 2013.   <https://books.google.iq/books?id=WaHTBQAAQBAJ&printsec=frontcover&hl=ar&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false>  ‎ |

**Marking:**

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| **First Semester** | **Final Exam** |
| |  |  |  |  | | --- | --- | --- | --- | | **1st exam** | **2nd exam** | **Practical** | **Activity** | | **10** | **10** | **6** | **4** | | |  | | --- | |  |   70 |

**Assignments and/or Projects:**

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| **Assignment/Project** | **Description** | **Due Date** | **Marking** |
| H.W | answering a series of questions with the end of each a week semester | During the course | 1 |
| Quizzes | Two or more quizzes | During the course | 1 |

**Instructor information:**

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| Lecture Room No.: [ 201 ] | Time:  **Thursday, 8:30-10:30** | |
| Instructor's Name: *Dr. Hazim H. Hussain Al-Saleem* | | Office No.: **5** | | |
| E-Mail: [*Dr.Hazim@uomustansiriyah.edu.iq*](mailto:Dr.Hazim@uomustansiriyah.edu.iq)  ***NOTES:***   * ***Office Hours: Other office hours are available by appointment.*** * ***The content of this syllabus not be changed during the current semester.*** | | | |  |

**Lecturer Signature ** Chairman Signature**