|  |  |  |
| --- | --- | --- |
| EXC-01-02-02A | **Form Number** | **Form:**  **Course Syllabus** |
| 2/3/24/2022/2963  05/12/2022 | **Issue Number and Date** |
|  | **Number and Date of Revision or Modification** |
| 2/3/24/2023 | **Deans Council Approval Decision Number** |
| 23/01/2023 | **The Date of the Deans Council Approval Decision** |
| 09 | **Number of Pages** |

|  |  |  |
| --- | --- | --- |
| **1** | **Course title** | Agro-Meteorology |
| **2** | **Course number** | 0634230 |
| **3** | **Credit hours (theory, practical)** | 3 Hours (Theory) |
| **Contact hours (theory, practical)** | 3 hours per week |
| **4** | **Prerequisites/corequisites** | - |
| **5** | **Program title** | Land, Water and Environment |
| **6** | **Program code** |  |
| **7** | **Awarding institution** | The University of Jordan |
| **8** | **School** | School of Agriculture |
| **9** | **Department** | Land, Water and Environment |
| **10** | **Level of course** | 2nd year Bachelor degree |
| **11** | **Year of study and semester (s)** | 1st Semester 2019/2020 |
| **12** | **Final Qualification** | Bachelor of Land, Water and Environment |
| **13** | **Other department (s) involved in teaching the course** | None |
| **14** | **Language of Instruction** | English |
| **15** | **Date of production/revision** | 01/3/2020 |

**16. Course Coordinator:**

|  |
| --- |
| **Dr. Fayha Al-Shibli**  **Office # 61**  **Office hours:**  **phone number : ext: 22445**  **email: f.shibli@ju.edu.jo** |

**17. Other instructors:**

|  |
| --- |
| None |

**18. Course Description:**

|  |
| --- |
| This course is an Introductory agricultural meteorology category for the undergraduate level. It introduces the definitions of agrometeorology, its importance, and its scope. It comprises the physics of the atmosphere with emphasis on laws of radiation, solar and terrestrial radiation, surface and atmospheric energy balances, heat budgets, precipitation formation, and atmospheric spheres. It is designed to provide comprehensive knowledge of agrometeorological variables and their measurements which will provide the students with the knowledge of Elements and factors of climate and Weather by focusing on winds, cloud formation, stability, precipitation processes, weather systems, and severe weather phenomena.    The course covers the Role of weather in determining risks and hazards and the use of weather data in planning and decision-making and also discusses techniques of weather forecasting. The course emphasizes on understanding the world climate drivers, monsoons and global circulations then explain the climate indices of Jordan. It analyses the meteorological data, their presentation, and the main statistical metrics used. The course provides information about climatic classification and its application and effects in agriculture and how to manage severe weather conditions on agriculture. |

**19. Course aims and outcomes:**

|  |
| --- |
| 1. **Aims:**   **By the end of the course, students will be able to:**   1. Familiarize with concepts of agricultural meteorology particularly on the atmosphere, weather and climate and how the different weather elements affect crop growth, development and yield. 2. Understanding the earth’s climate and being able to explain weather conditions. 3. The course will inculcate students with the knowledge of atmospheric physics that will lead to an understanding of climate change and climate variability effects on agriculture. 4. To describe the interactions between weather/climate and agriculture for both crop production and agricultural practices, thus enabling students to understand that the agricultural sector is weather/climate dependent. 5. Emphasis on understanding and exploiting climatic resources for the benefit of agriculture, considering that agrometeorological information plays an important part not only in making daily and seasonal farm management decisions, but also in risk management associated with weather and climate variability. 6. Understand the meteorological and climatological factors affecting the frequency and severity of a wide range of hazards faced by agricultural production. They will be able to advise farmers on planning that may mitigate some effects. They will also be aware of the methods used to predict hazards and their reliability and will be able to interpret forecasts and issue advisory warnings. 7. Measure the various weather parameters required for agrometeorological activities by teaching the working principles and accurate measuring techniques. This teaching will help in understanding the computation and interpretation of data.   **B- Intended Learning Outcomes (ILOs)**:  Upon successful completion of this course students will be able to   1. The course will provide information on various basic aspects of agricultural meteorology particularly on the atmosphere, weather and climate and how the different weather elements affect crop growth, development and yield. 2. Understanding the physics of the atmosphere with emphasis on laws of radiation, solar and terrestrial radiation, surface and atmospheric energy balances, heat budgets, precipitation formation, temperature, pressure, humidity, wind speed and atmospheric spheres 3. Students should be able to apply the tools in preparing different agrometeorological products for use by the farming community. 4. Understanding the characteristics of relevant weather phenomena of the Solar and Terrestrial Radiation and understanding the energy transfer by radiation, conduction, convection, and evapotranspiration and explain the factors that determine the distribution of solar energy over the Earth's surface and describe global patterns of temperature. |
| 1. Understand and critically examine the atmospheric phenomena of temperature, moisture conditions, atmospheric stability, forms of condensation and precipitation, air pressure and winds, circulation of the atmosphere, role of air masses, and weather patterns. 2. Describe the major cloud types and explain the phenomena of rainfall, fog, snow, hail, and frost. 3. Define a cold and warm front, explain the processes leading to the formation of each, and explain the formation of cyclones and anticyclones, tornadoes, hurricanes and typhoons. 4. Having a historical view of the strategic use of climate information in the areas concerned, and being able to assess the present situation and its potential, furthermore, in the near future for the areas concerned, with a good understanding of the difficulties likely to be encountered and their possible solutions. 5. Understanding the characteristics of extreme meteorological events and the ways in which farmers cope with them, in global and specifically in Jordan. 6. Understanding the computations and interpretation of data by analysing it using the basic statistic metrics. |

**20. Topic Outline and Schedule:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | Topic | Week | Instructor | Achieved ILOs | | Meteorology Definitions, fields, objectives, scope and applications | 1 | Dr. Al-Shibli Fayha | A1, B1, | | Agrometeorology Advisories, conditions and requirements | 1 | Dr. Al-Shibli Fayha | A1, B1, | | Physics of atmosphere, spheres and characteristic. | 2 | Dr. Al-Shibli Fayha | A2, A3, A6, A7, B1, B4 | | Weather elements, solar radiation definitions and radiation calculations | 3 | Dr. Al-Shibli Fayha | A2, A3, A6, A7, B1, B4 | | Energy balance models and laws, greenhouse effect, Instruments for measuring radiation | 4 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, B4, B5 | | Air temperature, definitions, measures, distributions, and variations. effects on agriculture | 5 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, B4, B5 | | Atmospheric pressure, pressure belts definitions, calculations, distributions and variations. Cyclones, effects on agriculture | 6 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, B5, B7 | | Wind, origins, types and speed calculations, air circulations, monsoons, Tornadoes and instruments, effects on agriculture | 7 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, B5, B7 | | Humidity and Vapour Evaporation, definitions and calcultaions, factors affecting humidity and instruments, effects on agriculture | 8 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, | | Evapotranspiration, calculations and instruments. effects on agriculture | 9 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, B4 | | Condensation and precipitation, forms and patterns, fogs and frosts, distributions and factors, artificial rain, effects on agriculture | 10 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, B1, B6 | | Clouds and their classification, measurements and indications of clouds to predict the weather conditions. | 11 | Dr. Al-Shibli Fayha | A2, A5, A6, A7, A6, A7, B1, B6 | | Monsoons, systems, Asia monsoon, north America monsoon, Indian Monsoon, Jet streams | 12 | Dr. Al-Shibli Fayha | B7, B9 | | Weather station and data, weather parameters and scales, agrometeorological stations types and measurements, how to analyse weather data, weather data statistics, distributions and probability. Instruction to measure dispersion. | 13 | Dr. Al-Shibli Fayha | A6, A7, B8, B10 | | Climate indices and driving forces for Jordan, winter, summer and transitional seasons Troughs, lows and highs and their characteristics | 14 | Dr. Al-Shibli Fayha | B7, B8, B9 | | Weather forecasting for agriculture, applications, synoptics. Weather hazards and their impact on crops and how manage them. | 15 | Dr. Al-Shibli Fayha | A1, A4, A5, B1, B3, B8, B9 | |

**21. Teaching Methods and Assignments:**

|  |
| --- |
| Development of ILOs is promoted through the following teaching and learning methods:   1. Lectures, face to face interactive meetings 2. group discussions for students’ assignments and reports 3. reading synoptic maps 4. Video visualization of weather elements and climate hazards 5. Field trip to weather forecasting centre introducing synoptic maps, satellite images and computer modelling in weather forecasting. |

**22.Evaluation Methods:**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Evaluation Activity** | **Mark** | **Topic(s)** | **ILO/s Linked to the Evaluation activity** | **Period (Week)** | **Platform** |
| Projects by select one of the followings:   * Group Tutorial Presentation (groups of 2-3 students); * Reading Synoptic maps (take a daily forecast); * Essay (proposal, 250 words and Essay, 2000 words); * Models (including discussion entries, 500 words) or * Reviewing Two Scientific Articles | 20 |  |  | Before Week 10 |  |
| Midterm exam (30%): on-campus exam | 30 |  |  | Week 7-8 |  |
| Final exam (50%): on-campus exam | 50 |  |  | Week 15 |  |

**23. Course Policies:**

|  |
| --- |
| * Regular and timely attendance are expected from all students. University regulations concerning class attendance will apply * Exams absentees can write makeup exams only if an acceptable and documented excuse is provided, for example, a medical report. Makeup exams are usually more difficult than regular exams * For more details on university regulations please visit: <http://www.ju.edu.jo/rules/index.htm> * If you have any issues get in contact with me right away. If somebody is going to miss a lecture (big deal), let me know ahead of time. * UoJ code of conduct and academic Integrity, Cheating, and Plagiarism are not acceptable / the consequences as mandated by the UoJ * Attendance is mandatory with no disturbance (*phones*). * Entering the classroom on time |

**24. Required equipment: (**Facilities, Tools, Labs, Training….)

|  |
| --- |
| 1. To train undergraduate students and motivate them to enroll in postgraduate studies in agricultural meteorology, it was decided to propose courses for teaching at the undergraduate level where agricultural and other allied programs were offered. These include a course on climate change and its impact on society in response to the increased attention to climate change. 2. Field trip to weather forecasting center introducing synoptic maps, satellite images, and computer modelling in weather forecasting. |

**25. Course Intended Learning Outcomes:** (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Course ILOs | The learning levels to be achieved | | | | | |
| Remembering | Understanding | Applying | Analysing | evaluating | Creating |
|  | **🗹** | **🗹** | **🗹** |  |  |  |
|  |  | **🗹** | **🗹** |  |  |  |
|  |  | **🗹** | **🗹** | **🗹** |  |  |
|  |  | **🗹** | **🗹** | **🗹** |  |  |
|  |  | **🗹** | **🗹** | **🗹** |  |  |
|  | **🗹** | **🗹** |  | **🗹** | **🗹** |  |
|  |  | **🗹** | **🗹** |  |  | **🗹** |  |
|  | **🗹** | **🗹** | **🗹** | **🗹** |  |  |
|  |  |  | **🗹** | **🗹** | **🗹** | **🗹** |
|  | **🗹** | **🗹** | **🗹** | **🗹** | **🗹** | **🗹** |

**25. References:**

|  |
| --- |
| Required book (s), assigned reading and audio-visuals:   * Gommes, R., Challinor, A., Das, H., Dawod, M.A., Mariani, L., Tychon, B., Krüger, R., Otte, U., Vega, R.E.R. and Trampf, W., 2010. Guide to Agricultural Meteorological Practices. *World Meteorological Organization*, (134). * Andrews, D.G., 2010. *An introduction to atmospheric physics*. Cambridge University Press. * Murthy, V.R.K., 2002. *Basic principles of agricultural meteorology* (pp. 4-4). BS Publications. * Rogers, D.P. and Tsirkunov, V.V., 2013. *Weather and climate resilience: Effective preparedness through national meteorological and hydrological services*. The World Bank. * <https://www.youtube.com/watch?v=7fd03fBRsuU> * <https://www.youtube.com/watch?v=xqM83_og1Fc> * <https://www.youtube.com/watch?v=PDEcAxfSYaI> * <https://www.youtube.com/watch?v=Lg91eowtfbw> * <https://www.youtube.com/watch?v=-D_Np-3dVBQ> * [El Nino - What is it? - YouTube](https://www.youtube.com/watch?v=WPA-KpldDVc) * [Met Office - Learn About Weather - YouTube](https://www.youtube.com/c/MetOfficeLearnAboutWeather) : all videos |

|  |  |  |
| --- | --- | --- |
| Name of the Instructor or the Course Coordinator:  …………Dr Fayha Al-Shibli…………… | Signature:  …… …… | Date:  ……..………… |
| Name of the Head of Quality Assurance Committee/ Department  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |
| Name of the Head of Department  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |
| Name of the Head of Quality Assurance Committee/ School or Center  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |
| Name of the Dean or the Director  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |