MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Basic learning activities**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BCE126**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	BCE		**College**	Type College Code	
Module Leader	Ameel Mohammed Al-Mayah		**e-mail**	drameel@kecbu.uobaghdad.edu.iq	
Module Leader's Acad. Title	Lect.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Zahraa Hameed Mohammed Mohammed Bassil		**e-mail**	zhraahameed@kecbu.uobaghdad.edu.iq mohammed.b@kecbu.uobaghdad.edu.iq	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop proficiency in using AutoCAD software for creating, editing, and managing 2D engineering drawings. 2. To familiarize students with the features and tools of AutoCAD Plant 3D software for creating Piping and Instrumentation Diagrams (P&IDs) specific to biochemical engineering. 3. To understand and apply engineering drawing standards, conventions, and best practices in the context of biochemical engineering projects. 4. To enable students to create accurate and detailed engineering drawings of equipment and components used in biochemical engineering processes. 5. To provide hands-on experience in creating plant layouts and equipment arrangements considering safety, efficiency, and regulatory requirements in biochemical engineering. 6. To introduce students to the symbols, notations, and annotations commonly used in P&IDs for representing equipment, instrumentation, and piping components in biochemical engineering. 7. To incorporate instrumentation, control valves, and piping specifications into P&IDs to accurately represent process control and instrumentation in biochemical engineering systems. 8. To develop skills in creating 3D models of equipment and piping systems using AutoCAD Plant 3D software for visualization and analysis purposes. 9. To emphasize the importance of accuracy, clarity, and organization in engineering drawings for effective communication and collaboration in biochemical engineering projects. 10. To enhance critical thinking and problem-solving skills by analyzing existing engineering drawings, identifying issues, and proposing appropriate solutions. 11. To promote teamwork and collaboration through group projects involving data exchange, version control, and project management using engineering drawing software. 12. To cultivate an understanding of the significance of engineering drawings in the design, implementation, and documentation of biochemical engineering processes and systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate proficiency in using AutoCAD softare for creating, modifying, and managing 2D biochemical engineering drawings. 2. Utilize AutoCAD Plant 3D software to develop Piping and Instrumentation Diagrams (P&IDs) for biochemical engineering processes and systems. 3. Apply engineering drawing standards, conventions, and best practices to create accurate and professional engineering drawings. 4. Generate equipment drawings, distillation columns, including pumps, reactors, and heat-exchangers, considering safety considerations and regulations in Biochemical Engineering.

	5. Create plant layouts and equipment arrangements that optimize process flow and adhere to industry standards in Biochemical Engineering. 6. Interpret and utilize symbols, conventions, and notations used in P&IDs to represent various equipment, instrumentation, and piping components. 7. Incorporate instrumentation, control valves, and piping specifications into P&IDs to accurately represent the process control and instrumentation in biochemical engineering systems. 8. Develop 3D models of equipment and piping systems using AutoCAD Plant 3D for visualization and analysis purposes. 9. Demonstrate effective documentation and organization skills for engineering drawings and project files related to biochemical engineering processes. 10. Apply critical thinking and problem-solving skills to analyze and interpret existing engineering drawings, identify potential issues, and propose appropriate solutions. 11. Collaborate effectively with team members in engineering drawing projects, including data exchange, version control, and project management. 12. Understand the importance of accuracy, clarity, and compliance in engineering drawings for effective communication and efficient implementation in biochemical engineering projects.
Indicative Contents المحتويات الإرشادية	The Indicative Contents include the following topics: **Introduction to Engineering Drawing:** • Importance and principles of engineering drawing • Standards and conventions in engineering drawing • Different types of drawings and their applications in Biochemical Engineering **Introduction to AutoCAD:** • Overview of AutoCAD software and its interface • Basic commands and functions in AutoCAD • Creating and modifying 2D drawings in AutoCAD **Advanced AutoCAD Techniques:** • Creating and managing layers, linetypes, and hatch patterns • Dimensioning and text annotation in AutoCAD • Plotting and printing drawings in AutoCAD **Introduction to AutoCAD Plant 3D:** • Overview of AutoCAD Plant 3D software and its features • User interface and navigation in AutoCAD Plant 3D • Creating and modifying P&ID diagrams using AutoCAD Plant 3D **Equipment Drawings and Plant Layouts:** • Creating equipment drawings such as pumps, reactors, and heat exchangers • Developing plant layouts and equipment arrangement in Biochemical Engineering

	• Incorporating safety considerations and regulations in equipment drawings **Piping and Instrumentation Diagrams (P&IDs):** • Understanding the symbols and conventions used in P&IDs • Creating P&IDs for various processes and systems in Biochemical Engineering • Incorporating instrumentation, control valves, and piping specifications in P&IDs **3D Modeling and Visualization:** • Introduction to 3D modeling concepts and techniques • Creating 3D models of equipment and piping systems using AutoCAD Plant 3D • Rendering and visualizing 3D models for presentation and analysis purposes **Project Documentation and Collaboration:** • Documenting and organizing engineering drawings and project files • Collaborative workflows and data exchange between AutoCAD Plant 3D • Version control and project management in engineering drawing projects **Industry Standards and Best Practices:** • Familiarization with industry-specific standards and codes for engineering drawing • Adhering to best practices in Biochemical Engineering drawing and design • Ensuring accuracy, clarity, and compliance in engineering drawings **Practical Applications and Case Studies:** • Applying engineering drawing principles and software tools to solve real-world engineering problems in Biochemical Engineering • Analyzing and demonstrating real plant drawings and P&IDs in the context of Biochemical Engineering processes • Case studies highlighting the importance of accurate and well-designed engineering drawings in Biochemical Engineering projects

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Lecture-Based Learning:** The course can begin with lecture-based sessions to introduce fundamental concepts and principles of engineering drawing, AutoCAD Plant 3D. Lectures can provide theoretical knowledge, demonstrations of software usage, and discussions on best practices in biochemical engineering. • **Hands-on Practice:** Hands-on practice is essential for developing proficiency in using AutoCAD Plant 3D. Students should have regular access to computer labs equipped with the necessary software. Lab sessions should be dedicated to practical exercises and projects, allowing students to apply the learned concepts, create drawings, and solve real-world engineering problems in biochemical engineering. • **Collaborative Learning:** Encourage collaborative learning by assigning group projects or activities that require teamwork. This promotes effective communication, problem-solving, and sharing of ideas among students. Group work can involve designing equipment layouts, creating 3D models, or developing comprehensive plant drawings in biochemical engineering using AutoCAD Plant 3D. • **Case Studies and Real-Life Examples***:* Integrate case studies and real-life examples from the field of Biochemical Engineering to illustrate the practical application of engineering drawing techniques. Analyze existing plant layouts, P&IDs, and equipment designs to identify strengths and areas for improvement. This approach helps students develop a deeper understanding of how engineering drawing is utilized in real-world scenarios. • **Continuous Assessment:** Implement continuous assessment methods such as quizzes, assignments, homeworks, classworks, and practical evaluations to monitor students' progress throughout the course. Assessments should cover both theoretical knowledge and practical skills in using AutoCAD Plant 3D. Provide timely feedback to students to help them identify areas for improvement and reinforce their learning. • **Resources and References:** Provide biochemical students with relevant textbooks, online resources, tutorials, and documentation for AutoCAD Plant 3D. Encourage self-study and exploration of additional features and functionalities of the software tools. This empowers students to expand their knowledge and enhance their proficiency beyond the scope of the course. • **Classroom Discussions and Q&A Sessions:** Foster classroom discussions to address biochemical student questions, clarify doubts, and encourage critical thinking. Q&A sessions can also serve as an opportunity for students to share their

	experiences, challenges, and innovative approaches they discovered while working on projects. • **Capstone Project:** Allocate time for a capstone project where students can apply their cumulative knowledge and skills acquired throughout the course. The project can involve designing a complete biochemical plant layout, including P&IDs, equipment drawings, and 3D models. This project allows biochemical students to showcase their abilities and creativity in utilizing AutoCAD 3D Plant.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ **15** اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2h/3	10% (10)	4 , 8 and 13	LO #1, - #7, #10, and #12
	Assignments	3h/6	10% (10)	2, 4, 6, 8, 10, 12, and 14	LO #1, #3 and #5, #7, #9-#12
	Projects / Lab.	3h/4	10% (10)	Continuous	All
	Report	0	-	-	-
Summative assessment	**Midterm Exam**	2h/2	20% (10)	6 and 12	All
	Final Exam	3h/1	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Engineering Drawing** • Overview of engineering drawing and its importance in Biochemical Engineering • Introduction to AutoCAD Plant 3D software and its interface
Week 2	**Basic Drawing Techniques** • Understanding drawing tools and commands in AutoCAD • Drawing basic shapes, lines, and curves • Applying layers, colors, and linetypes to drawings
Week 3	**Basic Drawing Techniques** • Understanding drawing tools and commands in AutoCAD • Drawing basic shapes, lines, and curves Applying layers, colors, and linetypes to drawings
Week 4	**Orthographic Projection** • Principles of orthographic projection in Biochemical Engineering • Drawing orthographic projections of simple objects in AutoCAD
Week 5	**Orthographic Projection** • Principles of orthographic projection in Biochemical Engineering Drawing orthographic projections of simple objects in AutoCAD
Week 6	**Isometric Projection** • Introduction to isometric projection and its application in Biochemical Engineering • Creating isometric drawings in AutoCAD
Week 7	**Isometric Projection** • Introduction to isometric projection and its application in Biochemical Engineering • Creating isometric drawings in AutoCAD
Week 8	**Piping and Instrumentation Diagrams (P&IDs)** • Introduction to P&IDs in Biochemical Engineering • Understanding P&ID symbols and their meanings • Creating P&IDs using AutoCAD Plant 3D software
Week 9	**Piping and Instrumentation Diagrams (P&IDs)** • Introduction to P&IDs in Biochemical Engineering • Understanding P&ID symbols and their meanings • Creating P&IDs using AutoCAD Plant 3D software
Week 10	**Equipment and Plant Layout Design** • Designing equipment layouts for biochemical processes • Creating 2D and 3D models of equipment using AutoCAD Plant 3D • Incorporating P&IDs into the equipment layout

Week 11	**Equipment and Plant Layout Design** • Designing equipment layouts for biochemical processes • Creating 2D and 3D models of equipment using AutoCAD Plant 3D • Incorporating P&IDs into the equipment layout
Week 12	**Assembly Drawings** • Creating detailed assembly drawings of biochemical equipment and components • Adding dimensions, annotations, and labels to assembly drawings
Week 13	**Assembly Drawings** • Creating detailed assembly drawings of biochemical equipment and components • Adding dimensions, annotations, and labels to assembly drawings
Week 14	**Project Work and Review** • Students work on a final project that integrates the skills and knowledge acquired throughout the course • Review and assessment of the students' project work using AutoCAD Plant 3D • Presentations of the final projects and feedback
Week 15	**Project Work and Review** • Students work on a final project that integrates the skills and knowledge acquired throughout the course • Review and assessment of the students' project work using AutoCAD Plant 3D • Presentations of the final projects and feedback
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to AutoCAD Plant 3D Overview of the course and lab expectations Familiarization with the software interface and basic commands
Week 2	Lab 2: Basic drawing techniques in AutoCAD Plant 3D Drawing simple shapes and lines Applying layers and colors to drawings
Week 3	Lab 3: Introduction to P&IDs in Biochemical Engineering Understanding P&ID symbols and their usage

	Creating P&ID drawings using AutoCAD Plant 3D
Week 4	Lab 4: Orthographic projection principles Drawing orthographic projections of simple objects in AutoCAD Plant 3D
Week 5	Lab 5: Isometric projection principles Creating isometric drawings in AutoCAD
Week 6	Lab 6: Designing equipment layouts for biochemical processes Creating 2D equipment layout drawings in AutoCAD Plant 3D
Week 7	Lab 7: Introduction to 3D modeling in AutoCAD Plant 3D Creating 3D models of equipment and components
Week 8	Lab 8: Incorporating P&IDs into the equipment layout Integrating 2D and 3D drawings in AutoCAD Plant 3D
Week 9	Lab 9: Creating assembly drawings of biochemical equipment Adding dimensions and annotations to assembly drawings
Week 10	Lab 10: Project work and review session Students work on a mini-project applying the skills learned so far
Week 11	Lab 11: Advanced drawing techniques in AutoCAD Plant 3D Exploring advanced commands and tools for more complex drawing
Week 12	Lab 12: 3D modeling of plant layouts using AutoCAD Plant 3D Creating 3D models of complete biochemical plants
Week 13	Lab 13: Generating detailed reports and documentation from P&ID drawings Creating Bill of Materials (BOM) and other relevant documentation
Week 14	Lab 14: Project work and review session

	Students continue working on their main project and receive feedback
Week 15	Lab 15: Final project presentation and assessment Presenting the main project to the class and receiving evaluations

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	AutoCAD Plant 3D 2023 for Designers, 7th Edition by Prof. Sham Tickoo Purdue Univ. and CADCIM Technologies (Author) https://www.amazon.com/AutoCAD-Plant-2023-Designers-7th/dp/1640571558	Yes
Recommended Texts	الرسم الهندسي، عبد الرسول الخفاف بغداد 1990.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.