Course Information

Language of Instruction: English

Course Level: Bachelor's Degree

Course Type : Compulsory

Mode of delivery : Lecture, question/answer, discussion

Course Coordinator and Instructors : Prof. Dr. Gülay ÖZKAN

Goals : Nearly all applied science consists of performing experiments and interpreting the results. This is done alternatively by looking for an idealized mathematical model of the system. The aim of the course is to teach how to write mathematical model, how to solve this model.

Course Content : The conservation laws of chemical engineering are applied to the model, and the results should be a mathematical equation which describes the system. The appropriate mathematical techniques are applied to ordinary differential equation or partial differential equations and results are interpreted .

Learning Outcomes

1) Derivation of proper equations for defined processes.
2) Applies the conservation laws of chemical engineering to the model
3) Solving chemical engineering problems by using analytical/ numerical techniques

Contents

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction of mathematical model	Lecture	REF. 1,2,3,4
2. Week	Models with Ordinary Differential Equations (Material balance)	Lecture	REF. 1,2,3,4
3. Week	Models with Ordinary Differential Equations (Energy balances)	Lecture	REF. 1,2,3,4
4. Week	Models with Ordinary Differential Equations (Momentum balances)	lecture	REF. 1,2,3,4
5. Week	Models with Linear Algebraic Equations (Material balances with and without chemical reactions)	Lecture	REF. 1,2,3,4
6. Week	Models with Ordinary Differential Equations (Material balances with /without chemical reaction)	Lecture	REF. 1,2,3,4
7. Week	Numerical solution method (Ordinary Differential Equations)	Lecture	REF. 1,2,3,4
8. Week	Models with partial differential equations (Material balances)	Lecture	REF. 1,2,3,4
9. Week	Models with partial differential equations (Energy balances)	Lecture	REF. 1,2,3,4
10. Week	Models with partial differential equations (Momentum balances)	Lecture	REF. 1,2,3,4
11. Week	Solution of partial differential equations (Method of separation variables)	Lecture	REF. 1,2,3,4
12. Week	Solution of partial differential equations (The laplace transform method)	Lecture	REF. 1,2,3,4
13. Week	Numerical solution of partial differential equations (Finite difference)	Lecture	REF. 1,2,3,4
14. Week	Solution of the second order linear differential equation with variable coefficient by Series (Bessel's equation, Modified	Lecture	REF. 1,2,3,4

References

1. J.Ingham,I.J.Dunn,E.Heinzle, J. E. Prenosil, J.B.Snape, Chemical Engineering Dynamic, Wiley, 2007

2. V. G. Jenson and G. V. Jeffreys, Mathematical Methods in Chemical Engineering. McGraw-Hill, 1975

3. Zafer Ahsen, Differential Equations and Their Applications. Prentice Hall of India, 2007

4. R. G. Rice, D. D. Do, Applied Mathematics And Modeling For Chemical Engineers, John Wiley and Sons, 995

5. İ.Tosun, Modeling in Transport Phenomena , Elsevier, 2007

ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Homework	3	10	30
Midterm Exam	2	10	20
Time to prepare for Midterm Exam	2	5	10
Quiz	3	10	30
Final Exam	1	10	10
Time to prepare for Quiz	3	10	30
Course Duration (Total weeks*Hours per week)	14	4	56
		Total Workload	186
		Total Workload / 30 (s)	6.20
		Ects Credit of the Course	6