BIOMEDICAL HEAT AND MASS TRANSFER

1	Course Title:	BIOMEDICAL HEAT AND MASS TRANSFER	
2	Course Code:	MAK4018	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	8	
7	ECTS Credits Allocated:	3.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. ERHAN PULAT	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	pulat@uludag.edu.tr , 0 224 2941982 Uludağ Üniversitesi, Makina Mühendisliği Bölümü, Oda No: 217, Görükle, 16059, Bursa.	
17	Website:		
18	Objective of the Course:	This course is aimed to apply basic transport phenomena principals to biological and biomedical systems.	
19	Contribution of the Course to Professional Development:	To contribute to the application of heat and mass transfer concepts to the interdisciplinary field of biomedical engineering.	
20	Learning Outcomes:		
		1	Learning of the basic principals and complexity of biological systems.
		2	Comprehension of the importance of transport processes in biomedical applications.
		3	Application of fluid mechanical, heat and mass transfer principals to biomedical systems.
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21	Course Content:		

Course Content:

Week	Theoretical	Practice
1	Introduction to bioengineering and biomedical engineering. The place of heat and mass transfer in bioengineering.	
2	Review of fluid mechanics.	
3	Continuation of fluid mechanical principals.	

4	Introductory biomedical applications of fluid mechanics, some examples.	
5	Introductory concepts in biofluid mechanics and physiological fluid mechanics.	
6	Review of heat transfer.	
7	Continuation of heat transfer principals.	
8	Repeating courses and midterm exam	
9	Introductory biomedical applications of heat transfer, some examples.	
10	Introductory concepts in bioheat transfer. Bioheat Equation.	
11	Thermal Comfort.	
12	Review of mass transfer. Analogy between heat and mass transfer.	
13	Introductory biomedical applications of mass transfer, some examples.	
14	Some steady and unsteady state mass transfer applications in biological systems.	
22	Textbooks, References and/or Other Materials:	1. Instructor Prepared Handouts. 2. Biological and Bioenvironmental Heat and Mass Transfer, A. K. Datta, Marcel Dekker, Inc., 2002, U.S.A. 3. Basic Transport Phenomena in Biomedical Engineering, R. L. Fournier, Taylor and Francis, 1999, U.S.A. 4. Introduction to Bioengineering, Edited by S. A. Berger, W. Goldsmith, and E. R. Lewis, Oxford University Pres. 5. Heat and Mass Transfer A Practical Approach, Yunus A. Çengel, Çağlar Publications, İzmir, 2010 6. Heat and Mass Transfer: A Practical Approach, Yunus A. Çengel, Çağlar Publications, İzmir, 2010 and D. P. DeWitt, Translation from 4th Ed., Literatür Publications, 2002 Revised 2nd Ed., 2004. 9. Biophysics, 2nd Ed., E. Pekkiyan, Hacettepe Tas Books Publications, Faculties Bookstore, 1995, İzmir 10. Biomedical Physics, 2nd Ed., G. Çeleb, Barış Publications, Faculties Bookstore, 1995, İzmir

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	2.00	28.00
Homeworks	2	4.00	8.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	12.00	12.00
Others	0	0.00	0.00
Final Exams	1	14.00	14.00
Total Work Load			102.00
Total work load/ 30 hr			3.00
ECTS Credit of the Course			3.00

23	Assesment	
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Midterm Exam	1	30.00
Quiz	0	0.00
Home work-project	2	10.00
Final Exam	1	60.00
Total	4	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		Midterm Exam, Homework, Final Exam

24	**ECTS / WORK LOAD TABLE**

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	3	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	4	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	5	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	**1 very low**		**2 low**			**3 Medium**			**4 High**			**5 Very High**				