

Module title: Radiation heat transfer

Module code: 24-14-702-01

Module credit: 3

Module objectives: This course is presented for graduate students in mechanical engineering. This course is designed to introduce a basic study of the phenomena of radiative heat transfer, to develop methodologies for solving a wide variety of practical engineering problems. A knowledge-based design problem requiring the formulations of transparent, semi-transparent and participating radiation heat transfer medium.

Term: Fall-January

Text: R. Siegel, J. R., Howell, *Thermal radiation Heat*, Fourth edition, 2001.
M. F. Modest, *Radiative Heat Transfer*, Third Edition, Academic Press, 2013.

Instructor information:

Name: Dr. Samira Payan
Academic rank: Associate professor
Email address: s_payan_usb@eng.usb.ac.ir

Assessments: The students learning will be evaluated according to the below table:

Attendance:	7.5%
Project (paper report and oral presentation):	10%
Homework:	10%
Mid-term exam:	12.5%
First mid-term	
Second mid-term	
Final-term exam(20% of the final exam No. related to software project):	60%

References

- [1] R. Siegel, J. R., Howell, *Thermal radiation Heat*, Fourth edition, 2001.
[2] M. F. Modest, *Radiative Heat Transfer*, Third Edition, Academic Press, 2013.

Module subjects:

- 1st week:** Introduction and blackbody radiation
2st week: definitions of properties for nonblack opaque surface
3st , 4th weeks: configurations factors for surfaces transferring uniform diffuse radiation
5st , 6th weeks: radiation exchange in enclosures composed of black and/or diffuse gray surfaces.

First mid-term

7st week: the exchange of thermal radiation between nondiffuse-nongray surfaces (directional-gray surface)

8st week: the exchange of thermal radiation between nondiffuse-nongray surfaces (directional-spectral surfaces)

Second mid-term exam

9st week: Radiation exchange among surfaces with specular reflections

10st week: Net-radiation method in enclosures having specular and diffuse reflecting surfaces

11st week: The Equation of Radiative Transfer in Participating Media

12st , 13th weeks: Exact Solutions for One-Dimensional Gray Media

14st week: Approximate Solution Methods for One-Dimensional Media

15st week: The Optically Thin Approximation

16st week: The Optically Thick Approximation

Final-term exam