

# Thermal Barrier Coatings for Gas Turbine Engine

Course code: ATB3

ECTS Credits: 1

<b>Department</b>	: MSISI	<b>Lectures</b>	: 12h00
<b>Lecturers</b>	: G. Hénaff, M. Vardelle (guest speaker)	<b>Tutorials</b>	:
<b>Year of study</b>	: 2 <sup>nd</sup> year	<b>Laboratory sessions</b>	:
<b>Semester</b>	: 3 <sup>rd</sup> semester	<b>Project</b>	:
<b>Assessment method(s)</b>	: 1 written test	<b>Home works</b>	:
<b>Language of instruction</b>	: English	<b>Total hours</b>	: 12h00
<b>Type of courses</b>	: Compulsory		

**Objective: Overview of thermal barrier coating technology and degradation processes**

**Prerequisites:** Materials Science & Engineering

**Content:** Thermal barrier coatings (TBC) operate in high-temperature environment of aircraft engines and are used to provide thermal insulation and to protect structural engineering materials from corrosion and erosion. They are now widely used in modern gas turbine engines to lower the metal surface temperature in combustor and turbine section hardware and so to improve the durability and energy efficiency of engines.

They are generally a complex combination of multiple layers of coatings, with each layer having a specific function and requirement. In this lecture, the current processes used to manufacture TBC, their structure, properties, and failure mechanisms will be reviewed. Also, the current limitations and present development will be discussed.

**Recommended reading:**

History of Thermal Barrier Coatings for Gas Turbine Engine, Robert A. Miller, NASA/TM—2009-215459

Thermal-Barrier Coatings for Advanced Gas-Turbine Engines, Dongming Zhu and Robert A. Miller, [MRS Bulletin](#), Volume 25, Issue 07, July 2000, pp 43-47

Thermal Barrier Coating Materials, David R. Clarke and Simon R. Phillpot, Materials today, [Volume 8, Issue 6](#), June 2005, Pages 22–29

Thermal Barrier Coatings for the 21st Century, M. J. Stiger, N. M. Yanar, M. G. Topping, F. S. Pettit, and G. H. Meier

Thermal Barrier Coatings for Gas-Turbine Engine Applications, [Nitin P. Padture](#), Science 12 April 2002: Vol. 296 no. 5566 pp. 280-284

Emerging materials and processes for thermal barrier systems, Carlos G. Levi, Current Opinion in Solid State and Materials Science 8 (2004) 77–9

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