# Advanced welding processes and Metallurgy

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## Overview

Welding and joining are essential for the manufacture of a range of engineering components, which may vary from very large structures such as ships and bridges, to very complex structures such as aircraft engines or miniature components for micro-electronic applications. A large number of joining techniques are available and, in recent years, significant developments have taken place in welding methodologies. Existing welding processes have been improved and new methods of joining have been introduced. The proliferation of techniques makes the process selection difficult and may limit their effective exploitation. The aim of this course is to provide an objective assessment of the most recent developments in welding process technology in an attempt to ensure that the most appropriate welding process is selected for a given application. Emphasis is also given to understand the influence of welding on the conventional and advanced materials including, carbon steels, stainless steels, aluminium and its alloys, titanium and its alloys and nickel based super alloys.

Course participants will learn these topics through lectures, case studies and assignments to stimulate research motivation of participants.

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| **Modules** | **Lecture 1 : An introduction to materials welding and joining : December 9, 2019**<br>**Lecture 2: Health and safety in welding and cutting : December 9, 2019**<br>**Lecture 3: Electrotechnology for welding: December 9 and 10, 2019**<br>**Lecture 5 and 6: Weldability of carbon and alloy steels: December 10 and 11, 2019**<br>**Lecture 7 and 8: Weldability of non-ferrous materials : December 11, 2019**<br>**Lecture 9: Joint design and terminology: December 12, 2019**<br>**Lecture 10: Control of welding processes: December 12, 2019**<br>**Lecture 11: On line monitoring of weld quality, implications of recent process developments on the measurement of arc energy. ISO/TR 18491.: December 13, 2019**<br>**Lecture 12: Repair and reclamation by welding: December 13, 2019**<br>**Lecture 13: Robotisation of welding processes: December 13, 2019**<br><br>**Number of participants for the course will be limited to 100.** |
| **You Should Attend If…** | ▪ you are an practising welding engineer or research scientist interested in understading the fundamentals of welding processes,<br>▪ you are metallurgist or mechanical engineer or design engineer interested to learn welding technology,<br>▪ you are a student or faculty from academic institution interested in learning the fundamentals of welding processes. |

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| **Fees** | The participation fees for taking the course is as follows:<br><br>**Participants from abroad : US $ 100**<br>**Student participants : INR ₹ 1000**<br>**Faculty participants : INR ₹ 5000**<br>**Industry : INR ₹ 6000**<br>**Govt. Research Organizations : INR ₹ 5000**<br>**Participants should pay an additional 18% GST or as applicable. (Note: The GST is not applicable for the Students Participants)**<br>The above fee include all instructional materials, tutorials and assignments. Tea and refrehsments will be provided two times a day. Candidate should make their own arrangements for lunch, dinner and accommodation. In view of severe shortage of water in IIT Madras campus, hostel accommodation is limited. Participants are encouraged to arrange their own accommodation.<br><br>**Modes of payment:**<br>Online transfer:<br>Account Name: CCE IIT Madras<br>Acc. No: **36401111110** Branch: SBI, IIT Madras Branch, Chennai<br>IFSC Code: SBIN0001055 Swift Code: SBININBB453<br>Note: The participants should be mentioned the purpose of GIAN while the transaction and have to send the transaction details to cceoffie@iitm.ac.in<br>**OR**<br>Demand draft in favour of "**CCE IIT Madras**" payable at **Chennai**. The demand draft is to be sent to the course coordinator at the address given below.<br><br>**Address of the Course Coordinator:**<br>Dr. Murugaiyan Amirthalingam,<br>Department of Metallurgical and Materials Engineering,<br>Indian Institute of Technology (IIT) Madras,<br>Chennai – 600 036,<br>Phone – 044- 2257 4784,<br>Email – murugaiyan@iitm.ac.in. |
| **Accommodation** | The participants may be provided with hostel accommodation, depending on availability, on payment basis. Request for hostel accommodation may be submitted through the link:<br>http://hosteldine.iitm.ac.in/iitmhostel/ |
| **Registration Procedure** | Please follow the following steps for the registration:<br><br>1. Go to GIAN website (http://www.gian.iitkgp.ac.in/GREGN/index) First time users need to register and pay a one-time fee of INR 500 /<br><br>2. Enroll for the course: **Advanced welding processes and Metallurgy**. Once you enroll for the course, an Enrollment/Application number will be generated, and the course coordinators will be notified. |

# The Faculty

Prof. John Norrish is a leading figure in welding education and research for the last four decades and responsible for the wide development of numerous advanced welding process methodologies and electronically regulated, computer controlled welding power supplies to the welding industries. Prof. John Norrish has over 200 research publications and his definitive welding textbook “Advanced Welding Processes” is used through the world.

Prof. John Norrish is an Emiterus professor in the Univeristy of Wollongong, Australia and also currently heading the Defence Materials Technology Centre Ltd., in the University of Wollongong, Australia. He was instrumental in the genesis and operations of this centre which carries out multi partner collaborative research aimed at providing the defence industry with materials and manufacturing solutions.

**Dr. Murugaiyan Amirthalingam** is an Assistant Professor and Head of Joining and Additive Manufacturing Lab in the department of Metallurgical and Materials Engineering. His teaching and research area include (i) Welding Processes (ii) Welding Metallurgy (iii) Metal Additive Manufacturing and (iv) Mathematical Modelling of Weld Phenomena.

## Course Co-ordinator

**Prof. Murugaiyan Amirthalingam**
Phone: 044-2257 4784
E-mail: murugaiyan@iitm.ac.in

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