Course Objectives: The objectives of this course are to present the elements and practical aspects of high temperature alloys which are conventionally known as superalloys. Superalloys are based on the metals nickel, cobalt and iron. This course should enable participants to understand the various forms and treatment of the above alloys, how they are achieved and how their properties respond to processing techniques such as mechanical deformation and heat treatment. At the completion of the course, students should be able to make realistic assessments of the capability of specific superalloys and ask appropriate questions of alloy providers or materials engineers about the expected performance of such alloys.


Course Requirements: The course will be presented in two sections. The first section, by Prof. Donachie, will cover introduction to and manufacture of superalloys plus properties of nickel-base superalloys. The second section, by Prof. Marcin, will cover properties of cobalt- and iron-base superalloys plus environmental concerns and casting processes use to produce superalloy articles. Lectures will use slides, transparencies, digital projection or combinations of all three media. Two examinations will be given, one for each section. Numerical grades will be assigned for each exam but letter grades will be given for the course. Each of the two examinations will be worth 50% of your grade. Numerical grades will be averaged for each exam and a final letter grade (with plus or minus as necessary) will be delivered to the school. We have no preset distribution of grades.

If you are unable to take a scheduled examination, a makeup examination will be given, provided that a satisfactory excuse is presented. It should be pointed out that the makeup examination may, in fact, be more difficult than the original examination.

Examinations generally are structured so as to focus on a situation representative of a “real world” problem. No numerical work is involved in this course. Homework may be assigned but is not usually a part of this course. Reading assignments will be delivered in class and via email. Any reading additional to the texts will be through articles posted on the course web site or distributed as hard copies in class. We reserve the right to provide web-based locations of relevant information for student access.

Class attendance is expected and grading may reflect the extent to which you have attended scheduled classes and participated in class discussions. If you are unable to attend class, it is your responsibility to arrange with one of the other students to receive the lecture notes and any handouts. We will only distribute each handout once.
**Student Learning Outcomes:**
Learning outcomes are as stated above under course requirements. We expect students to be fully aware of the variations in alloy chemistry, processing (casting, wrought processing) and heat treatment possible with such alloys. We expect students to also be aware of potential problems inherent in the alloys, particularly with regard to processing and heat treatment. All students must be able to deliver a coherent and consistent dissertation on alloy behavior under specified conditions. However, students are not expected to be completely familiar with alloy chemistries nor total aspects of alloy modification possible but would be capable of logical and informative discussions with materials/metallurgical engineers.

**Academic Integrity:**
Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments which students turn in are their own. Acts, which violate this trust, undermine the educational process.

1. The Rensselaer Handbook defines various forms of Academic Dishonesty and procedures for responding to them. All forms are violations of the trust between students and teachers. Students should familiarize themselves with this portion of the Rensselaer Handbook and should note that the penalties for plagiarism and other forms of cheating can be quite harsh.

The Handbook can be found at [http://www.ewp.rpi.edu/publications/catalog/index.html](http://www.ewp.rpi.edu/publications/catalog/index.html) (see Student Handbook Table of Contents, Policies [blue pages, back section])

**Buckley Amendment:** The Family Educational Rights and Privacy Act (Buckley Amendment) guarantees privacy to students, particularly in the areas of grades and performance.

**Course Schedule:** See attached.