

ADVANCED MASTER IN INNOVATIVE DESIGN

Training based on the Theory of Inventive Problem Solving (TRIZ)
and on the General Theory of Advanced Thinking (OTSM-TRIZ)

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- *Academic level: Post-graduate Studies.*
 - *Theoretical and practical training in Innovative Design.*
 - *Open to graduates with a 4-year University degree under certain conditions.*
 - *413 hours of theoretical courses (lectures and group work).*
 - *Units may be awarded by equivalence.*
 - *Teaching staff of lecturers, researchers, professionals and international Experts.*
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Course aims

To provide our participants with efficient, scientifically based instruments to deal with complex, non-typical problems in a cross-disciplinary environment. The knowledge gained throughout the program will provide you with a deeper understanding of the root causes of complex cross-disciplinary problems occurring in your professional and personal life. It will help you step-by-step to build appropriate solution concepts, which can then be implemented according to the available resources of the specific problem situation. You will have access to a body of OTSM-TRIZ knowledge drawn from the experience of hundreds and thousands of inventors and innovators throughout human history.

This body of knowledge also constitutes a reliable basis for decision making, strategic planning and forecasting. It can either be used for urgent, critical situations or to find the root causes of failures in engineering and manufacturing systems or in organizational functions. It is General Meta Knowledge which deals with how to efficiently capitalize upon specific knowledge gained from experience and could therefore be applied to many fields of human activity.

Course participants must develop a final project based on the analysis of a real complex problem situation pertaining to the activity of their organization.

Who are the participants?

The course is initially aimed at decision makers, and people who have to provide decision makers with analytical information, responsible for innovation and the daily life of their organization.

The program is also addressed to professionals with design and/or research experience (engineers, researchers, managers of R&D departments) and who want to increase their analytical and problem solving skills. The OTSM-TRIZ problem solving process has several secondary benefits. It provides useful knowledge for forecasting purposes, strategy development and organizational tactics. It encourages the evolution of your products and services by helping to plan and carry out research and development activities that ensure innovation in your processes. This in turn improves the quality of your products, services, manufacturing and business processes which increases the competitiveness and sustainable development of your organization.

Our program is beneficial for managers and professionals in the following fields:

- various classical divisions;
- strategic planning departments;
- innovation or R&D divisions;
- research and educational institutions;
- divisions and organizations which provide information services;
- intellectual property and assets management;
- knowledge management departments;
- engineers of any field could also benefit from this program in their everyday professional activity.

All of the above may also use those tools acquired during the course in their personal life.

Characteristics of the master's program

The Advanced Master's Degree Specializing in Innovative Design has the accreditation of the "Conférence des Grandes Ecoles".

The "Conférence des Grandes Ecoles" is a non-profit association founded in 1973. It has 219 members, 175 of which are directors of French "Grandes Ecoles", 9 are international universities and 35 are higher education institutions and organizations. One of its roles is to encourage innovation in engineering and management education and to develop continuing education and research activities.

The "Advanced Masters" are labels delivered by the authority of "Conférence Des Grandes Ecoles". They are recognized as post-graduate studies aiming at delivering a unique program of knowledge in a professional domain where enterprises have expressed their needs. The "Advanced Master" is obtained after a rigorous procedure of capability which ensures the highest quality of the delivered skills. The "accreditation" is delivered by the president of "Conférence Des Grandes Écoles" after receiving the approval by a commission of referees representing industry and education.

This Master's program carries the equivalent of 60 ECTS (European Credit Transfer System – used for facilitating student mobility and international curriculum development in accordance with the Bologna Declaration of 1999 and fixed at the Berlin Conference of Ministers responsible for Higher Education in 2003).

The teaching team of this Program is composed of full professors as well as world-wide experienced practitioners: Michel SONNTAG (Various human factors of Innovation), Roland DE GUIO (Management of Innovation in Industry, Education and other organizations), Nikolai KHOMENKO (OTSM-TRIZ technologies for Innovation). Moreover, all other teachers of this program are also researchers in the area of innovative design (on methodological aspects, human factors or management science).

Course Content

First set of modules: Various Aspects of Innovation relevant to Human activity, Management and Law.

Module 1: Management of Innovation

The aim of this module is to be able to integrate all the dimensions of the organization in innovative activities. In fact, such activities can't be separated from organizational, strategic or financial questions. In the module, different theoretical aspects (on invention, innovation or linked concepts) and several models of innovation processes are studied in the framework of innovative design.

Module 2: Innovative Design and Industrial Property

This module aims at delivering basic skills regarding Industrial property:

- Determining what is an invention
- Determining the novelty of an invention
- Determining inventive steps in an invention.

Module 3: TRIZ team management and communication around TRIZ

Analysis of communication barriers between the TRIZ team and the rest of the company. Techniques for presenting arguments to senior management (marketing, production, R&D, human resources). How to build and choose the members of a TRIZ team which will be able to go beyond psychological resistance and take into account personal strategies and the company's development.

Second set of modules: Introduction to Classical TRIZ and OTSM

Module 4: TRIZ: theoretical foundation and principles

This module is intended as the introductory module to the foundations of TRIZ. It covers the historical and structural aspects of TRIZ and acquaints the learners with the essential notions of Inventive Problem Solving. It consists of the following topics: understanding the incoherencies and limits of current approaches; understanding the foundations of TRIZ through its body of knowledge; synthesizing design directions by using the multi-screen scheme of thinking; conducting an inventive problem solving process for a simple case by using the inventive principles and matrix.

Module 5 : TRIZ: methods and tools

This module is mostly dedicated to the study and practice of Substance-Field analysis and the 76 Inventive standards. The theoretical part of the course includes the topics: How to reduce the research area within the problem solving process whilst building a conceptual solution? The basic concepts of OTSM-TRIZ. How the Laws of Technical Systems Evolution (LTSE) can be purposefully applied to inventive problem solving? The pointer of Effects and Phenomena is discussed. Preliminary information about the Algorithm of Inventive problem Solving (Russian acronym – ARIZ) is provided.

Module 6 : ARIZ: theory and practice

The content of module is focused on the Algorithm of Inventive Problem Solving (ARIZ) in its classic version – Altshuller's ARIZ. The learning process is organized around a case study which students have to prepare in advance. The peculiarity of the problem solving process in the light of OTSM-TRIZ concepts is discussed thematically: the Principal line of problem analysis, Analysis of the Initial situation, contradictions: Definition and reformulation. More than fifty percent of the time is dedicated to practice. At the end of the module, students present the results of their case study analysis within a concluding workshop.

Third set of modules: Mastering Classical TRIZ and OTSM In order to develop the necessary skills much of the teaching takes place through exercises. The main exercise is work on the final projects during the classes. Students will also be given assignments to work on their final projects between sessions.

Module 7 : Fundamentals of Classical TRIZ and OTSM.

Problem Flow Networks approach: OTSM-TRIZ Contradiction Technology.

Throughout this module you will study the key scientific problem that should be solved by classical TRIZ and OTSM. Assumptions that have been made in order to work on the scientific problems, the development of background models and instruments during the evolution of classical TRIZ and OTSM and how to put the above into practice for problem solving activities and the management of the problem flow of your projects and organizations. OTSM-TRIZ Contradiction Technology is based on classic ARIZ developed by Genrich Altshuller, the author of classic TRIZ. This technology is a corner stone of all OTSM-TRIZ technologies as well as the Problem Flow Networks approach. This is why will cover it in detail over the next four modules.

Module 8 : Problem Flow Networks approach :

OTSM-TRIZ New Problem and Contradiction Technologies.

New Problem Technology is dedicated to the transformation of fuzzy, often cross-disciplinary, problem situations into a system of clear problems to be resolved.

Module 9 : Problem Flow Networks approach :

OTSM-TRIZ Problem Flow and Contradiction Technologies

The Problem Flow approach provides you, not only with instruments to analyze and solve problems, but also with instruments to evaluate discovered solutions. OTSM-TRIZ Problem Flow Technology is dedicated to dealing with new problems which arise during the problem solving process, evaluating them and using all of them in order to construct (not look for, but construct!) a final solution concept step-by-step.

Module 10: Problem Flow Networks approach:

OTSM-TRIZ Typical Solution and Contradiction Technologies

OTSM-TRIZ Typical Solution Technology will show you how typical solutions can be used for solving non- typical problems.

Module 11: Various Applications of Problem Flow Networks approach.

The Problem Flow Networks approach and its main technologies open new horizons for various applications: protecting your ideas from competitors and bypassing their patents; forecasting the evolution of your product, services and the business processes of your organization; dealing with research problems; managing your research subject and the problem flow of your organization. You could use this approach in order to develop your own technologies for all of the above and for almost any new field of application within your private and professional activities.

Innovative design project: minimum 4 months

The aim of the project is to validate theoretical knowledge through hands-on experience in the field, under the supervision of the course lecturers. During the internship, the student studies TRIZ in practice by analyzing the requirements and difficulties of

implementing an innovative design approach in a company and the strategies adopted. In addition to submitting progress reports to the teaching staff, students are required to present their work at the end of the course in a professionally oriented thesis which formalizes the problem, states the logic strategy and the stages in the design approach and analyzes the difficulties encountered.

The theme addressed must correspond to a real matter for concern for experts and companies. The role of the tutor is therefore of utmost importance when the theme is selected. This approach paves the way for a broad scope of theoretical and experimental research, if a strict scientific method is respected. This is particularly required for any analysis or practical application, which must be conducted with reference to an acknowledged, and relevant, strategy of thought. The thesis is presented in a viva before a panel of experts and the entire project is integrated in the assessment system.

Modalities of getting diploma and knowledge evaluation

1. Unit definition: Each unit is based on a topic and may include lectures, seminars and practical sessions according to the subject in question. The means of assessment are specified at the beginning of each unit.
2. Degree requirements: Overall assessment is as follows: course assessments on the theoretical units account for 50% of the overall assessment, and the professionally oriented thesis accounts for the other 50% of the assessment.

The professional project on an innovative design case is written up in a professionally oriented thesis, which is presented during a viva. Students must find the host company for their project. They choose the subject of their professionally oriented thesis in agreement with the teaching staff who shall validate the title and approach method. To obtain the degree, an overall average grade of at least 10/20 is required. If any grade is below 7/20 for any unit or the thesis, the student must retake that part of the course at the following sitting.

Units passed are valid for 2 sittings and students wishing to retake must pay the enrolment fees. Should the course not be completed within the time limit of 2 sittings, a course certificate can be awarded to students who attended the course regularly (attendance rate equal to or above 90%).

Information and enrolment

Information, costs and enrolment

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DOWNLOADS

- Flyer: <http://www.insa-strasbourg.fr/medias/formation-continue/triz/innovative-design.pdf>
- Application form: <http://www.insa-strasbourg.fr/medias/formation-continue/masteres-specialises/application-form-08-09.pdf>
- Some slides from handout materials: <http://www2.insa-strasbourg.fr/triz/amid.php>

You can request the application form by fax, mail, email or phone. It must be returned to the following address:

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