

The Edward de Bono Institute for the Design and Development of Thinking
UNIVERSITY OF MALTA

Master in Creativity and Innovation

AIMS AND STUDY UNITS DESCRIPTIONS

Courses commencing October 2008 or later

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MASTER IN CREATIVITY AND INNOVATION
Course Aims and Objectives

In a changing environment, the future is not necessarily a repetition of the past. There is a central role for human thinking processes to cope with and make the best of the changes which are occurring all around us. The Master in Creativity and Innovation focuses directly on the skills of creativity and design.

The Master in Creativity and Innovation is an innovative and challenging programme, designed to be useful for anyone who wishes to improve their skills where creativity and innovation are concerned. An integration of experiential and cognitive approaches prepares participants to tackle concrete situations in a flexible manner which allows for the development of operational skills and creative possibilities.

The Master Degree Program is based on the world-renowned de Bono methods and on creativity, innovation and management in organisations - which applies to all fields as it is understood in a broad sense. Graduates would be expected to move on to managerial posts in organisations that recognise and value the crucial importance of key competencies, transferable skills and knowledge where creativity and innovation are concerned.

The Master in Creativity and Innovation is composed of both taught study units and research. Students are expected to obtain a total of 90 ECTS over a period of three academic semesters full time or six academic semesters part time (60 ECTS - taught study units; 30 ECTS - final dissertation). The study units will be offered during the daytime (ca. 0800 – 1700 hrs). Maltese residents who wish to follow this Master program on a part time basis will be expected to make all the necessary arrangements to attend lectures as attendance is compulsory.

Due to the interdisciplinary nature of this postgraduate degree, students are expected to come from a number of different backgrounds that include business management, marketing, economics, policy, IT, media, education, and other fields. These would consist of ambitious and motivated persons who acknowledge the importance of creativity and innovation in today's global and constantly changing environment and who wish to become instigators of change in their particular field of expertise. The Master in Creativity and Innovation includes a number of workshops through which students can apply the methods, skills and techniques that they learn.

Through this postgraduate degree, the University of Malta is offering a specialist, innovative, unique and interdisciplinary post-graduate degree which should be useful in a number of organisational contexts. For further information on the University of Malta see <http://um.edu.mt>. International students can access relevant details on the International Office website at <http://um.edu.mt/intoff>.

“Traditional university education has been concerned with knowledge, analysis and judgement. In a rapidly changing world, the categories and classifications derived from the past may not be enough. There is also a need to develop the skills of design in its broadest sense: new concepts, new perceptions and new ways of doing things. Such design needs creativity. For the first time in history, we can now treat creativity in a systematic way as the changing of patterns in self-organising systems. There is a growing demand for such new thinking and a need to pay attention to these new demands from society.”

Edward de Bono.

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UNIVERSITY OF MALTA
The Edward de Bono Institute for the Design and Development of Thinking
MASTER IN CREATIVITY AND INNOVATION
PROGRAMME OF STUDY
(for courses commencing October 2008 and later)

TAUGHT COMPONENT

In addition to the compulsory study-units, students are required to register for a total of 24 ECTS credits as elective study-units, from the list shown hereunder:

YEAR ONE

Semester 1

Compulsory Study-Units (all students **must** register for these units)

IOT 5019 Creativity: Idea generation, methods and applications	10 credits
IOT 5020 Entrepreneurship: Innovation and foresight in practice	8 credits
IOT 5021 Strategic marketing and creative decision making	6 credits
IOT 5004 Qualitative and quantitative research methods	6 credits

Elective Study Unit

IOT 5011 Creativity and innovation in the media	4 credits
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Semester 2

Compulsory Study Units (all students **must** register for these units)

IOT 5023 Creativity, innovation and new digital technologies	6 credits
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Elective Study Units

IOT 5006 Enhancing business performance through strategic innovative design	4 credits
IOT 5007 Foresight techniques for creativity and innovation	4 credits
IOT 5024 Creativity: Psychological perspectives	4 credits
IOT 5025 Innovation diffusion: Selection, complexity and probability dynamics	4 credits
IOT 5026 Innovation in organisations	4 credits

IOT 5027 Creativity and innovation in education, science and technology 4 credits

RESEARCH COMPONENT

YEAR TWO

Semester 3

Compulsory Study Unit (all students **must register for this unit)**

IOT 5030 Dissertation 30 credits

Total Workload 90 credits

Requirement for award of Master in Creativity and Innovation:

60 credits – taught study-units

30 credits – research component

90 credits – total credits

Note. This course of study is governed by “The General Regulations for University Postgraduate Awards, 2007” and by the Bye-Laws for the award of the Master in Creativity and Innovation under the auspices of the Edward de Bono Institute for the Design and Development of Thinking.

Code:	IOT 5019
Title:	Creativity: Idea generation, methods and applications
Type:	Lectures, workshops and distance learning
ECTS Credits:	10
Pre-Requisite Study Units:	nil
Method of Assessment:	Presentation: 25% Assignment: 25% Examination: 50%
Result:	Percentage Mark and Grade
Lecturers:	Professor Edward de Bono, Dr. Sandra M. Dingli and Ms. Shirley Pulis Xerxen (coordinator)

Learning Objectives:

On completion of this study unit students are expected to:

- Understand the importance of creativity and the manner in which theorists claim that it can be generated
- Understand the important role that perception plays in the process of thinking and of creativity
- Learn to apply tools and methods (including Edward de Bono's Lateral Thinking, Six Thinking Hats, DATT and CoRT tools) which will enable them to generate new ideas and to broaden their perception
- Be proficient in the application of various methodologies and to understand the variety of situations to which they may be applied.
- Apply critical thinking skills to their own work and that of others

Description:

This study unit offers a variety of perspectives on creativity with particular emphasis on the de Bono thinking methods. Students will gain an understanding of the implications of creativity and its applications. Interactive workshops will enable students to apply the tools of creative and critical thinking

During the intensive workshops which will form an integral part of this study unit, emphasis will be placed on the variety of uses for these methodologies and on the practical application of the tools learnt. Students will be expected to understand the importance of skill acquisition (as opposed to knowledge or understanding) where such methodologies are concerned.

The topics which this study unit will cover include the following:

- An introduction to creativity and creative thinking
- The importance of perception
- Edward de Bono's tools and methods:
 - Lateral thinking
 - Six thinking hats
 - DATT and CoRT
- Other generic creativity tools and applications (eg. TRIZ, SCAMPER and CPS)
- Mind mapping
- Critical Thinking

Serious Creativity and Lateral Thinking

Understanding the logic of creativity does not itself make you more creative. But it does make you aware of the necessity for creativity. It also explains the design of certain creative techniques and shows why apparently illogical techniques are actually quite logical within the logic of patterning systems. Above all, understanding the logic of creativity motivates a person to do something about creativity.

(de Bono, 1993: 5)¹

The great focus on developing creative thinking tools and skills that is happening across the world indicates a broadly shared view that creativity and innovation are crucial to success within the emerging global knowledge community.

Lateral thinking, in contrast to logical or rational thinking, is unpredictable and unconventional – thinking outside the box. In de Bono's words lateral thinking 'emphasizes the searching for different approaches and different ways of looking at things.' (de Bono, 1993: 54)¹. He further suggests that lateral thinking skills can be learnt and that there are specific techniques that can facilitate this acquisition.

DATT (Direct Attention Thinking Tools) and CoRT (Cognitive Research Trust)

Edward de Bono's *DATT (Direct Attention Thinking Tools)* and *CoRT (Cognitive Research Trust)* are thinking programmes specifically designed for use in business management (DATT) and education (CoRT). They consist of a number of thinking tools that are simple but which, when used effectively, can be very powerful. The tools help to make thinking performance more deliberate, more structured, more organised and more effective. Correct use of the thinking tools helps to avoid wrong decisions.

Knowledge of the DATT and CoRT thinking tools will help students to improve the quality of their thinking, become team leaders and be prepared to accept new responsibilities. It will help them to broaden their perception, take more effective decisions and tackle problem solving in a more structured manner.

Six Thinking Hats

The Six Thinking Hats are often used to analyse a topic, to generate a number of perspectives and in conflictual situations. They are a convenient way of putting Parallel Thinking into practice - this is very different from argument. The hats and colours are designed to make Parallel Thinking a practical process that can be remembered and easily put to use. With the Six Hats method it is possible to separate the different aspects of thinking instead of trying to do everything at once. The Six Hats method may therefore be used as a 'release' from the argumentative mode as it lays out all views side by side in parallel and provides possibilities for designing a way forward.

Critical Thinking

Participants will be provided with tools to develop their critical thinking skills. Critical thinking involves a process of evaluation, and this can be applied to statements, arguments, experiences and action. Critical thinking is a skilful activity that is contrasted with unreflective thinking. Good critical thinking meets a number of intellectual standards. Some attitudes that are necessary conditions for the development of critical thinking include intellectual curiosity, objectivity, open-mindedness, flexibility, intellectual skepticism, intellectual honesty, being systematic, persistence, decisiveness and respect for other viewpoints. Critical thinking further involves developing skills to identify assumptions, ask pertinent questions and draw out implications.

¹ de Bono, E. (1993). *Serious Creativity*. Des Moines: Advanced Practical Thinking Training Inc.

Reading List

- Bowell, Tracy and Kemp, Gary (2007). *Critical Thinking*.
- Brookfield, Stephen D. (1991). *Developing Critical Thinkers, Challenging Adults to Explore Alternative Ways of Thinking and Acting*. Jossey-Bass Publishers, San Francisco, Oxford
- Buzan, Tony (2005). *Mind Maps at Work*.
- de Bono, Edward (2000). *Six Thinking Hats*.
- de Bono, Edward (1991). *Conflicts: A Better Way to Resolve Them*.
- de Bono, Edward (1993). *Teach Your Child How To Think*.
- de Bono, Edward (1992). *The Five Day Course in Thinking*.
- de Bono, Edward. *CoRT Programme and Workcards*.
- de Bono, Edward. *DATT Programme*.
- de Bono, Edward (2005). *The Six Value Medals*.
- de Bono, Edward (1993). *Serious Creativity*.
- de Bono, Edward (1996). *Sur/Petition*.
- de Bono, Edward (1990). *Simplicity*.
- Flew, Antony (1985, 1995). *Thinking About Social Thinking*. Prometheus Books, New York.
- Paul, Richard W. (1993) (revised third edition). *Critical Thinking, What every person needs to survive in a rapidly changing world*. Eds. Jane Willson and A.J.A. Binker, Foundation for critical thinking, Santa Rosa, CA.
- Shermis, S. Samuel (1992). *Critical Thinking: Helping Students Learn Reflectively*. Edinfo Press, ERIC Clearinghouse on Reading and Communication Skills, Indiana

Code:	IOT 5020
Title:	Entrepreneurship: Innovation and foresight in practice
Type:	Lectures, workshops and distance learning
ECTS credits:	8
Method of Assessment:	Presentation: 15% Assignment: 35% Examination: 50%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturers:	Mr. Roy Fewster, University of Teesside, UK and Ms. Leonie Baldacchino, University of Malta

Learning Objectives:

On completion of this study unit students are expected to demonstrate their ability to:

- Demonstrate a comprehensive, detailed and critical understanding of the processes involved in entrepreneurship in multiple contexts and from different perspectives.
- Synthesize disparate concepts and theory introduced in the module into a coherent overview of entrepreneurship in practice.
- Conceptualise, identify, design and integrate a range of processes used in the creation, sustainability, development and growth of an enterprise, e.g.
 - Strategic awareness, sense-making and foresight
 - Networking and relationship building
 - Generating and evaluating opportunities
 - Innovation and experimentation
 - Designing and planning enterprise practice
 - New venture, project and value creation
- Critically examine their own competences, identity and practices with regard to entrepreneurial behaviour and enterprise development.
- Develop a critical understanding of the process of being entrepreneurial in the creation of a plan for a new venture from an innovative idea.
- Evaluate the conditions and activities that influence the degree of entrepreneurial behaviour in an organisational context and critique normative approaches to the creation of corporate and social entrepreneurship.

Description:

In a reflexive risk society, where innovation and creativity produce new knowledge, entrepreneurship turns ideas and innovations into manifest everyday practice. Entrepreneurship can be found in many organizational settings, including SMEs, corporate organizations and the public sector. It can be argued that entrepreneurship is the process by which the future is created from ideas and innovations.

This study-unit will use the creation of a new venture as a model of entrepreneurship. The course will simulate the development of a new venture through the creative practices of the participants. In the process key theories and ideas will be presented and discussed.

The structure is designed to support the kind of learning required (*Toohy 1999 p92.*); a cognitive structure emphasising key concepts, themes and intellectual abilities.

The module starts with an introduction and explanation to the field of entrepreneurship establishing an understanding of some fundamental concepts and trends in research in the field. Frequently asked questions and common perceptions are posed and challenged. The perspective of the participants, their background, experiences and national culture will be explored in relation to their understanding of entrepreneurship and the notion of entrepreneurial behaviour. Linkages are made with innovation, creativity and foresight.

The module then explores the processes of entrepreneurship in the discovery, evaluation and the exploitation of opportunities. This follows a logical sequence from initial ideas and innovation through the emergence and evaluation of the opportunity into a planned and shaped activity and into the implementation process. The module provides an alternative perspective to traditional theory in business and management in which rationality, analysis and prediction are prominent to one which is predominantly heuristic, iterative, reflexive, reflective and experimental.

The emphasis is upon peer and learner directed activities with a focus upon interactive involvement in which tutors are facilitators in the learning process.

Indicative Content

- The nature of enterprise, entrepreneurs, entrepreneurial behaviour and entrepreneurship. Who and what are entrepreneurs? What do entrepreneurs do (how do they perform)? Why do they become entrepreneurs? Are entrepreneurs born or made? Cognitive and sociological perspectives. Why are there different perspectives?
- Ideas, innovation and opportunity. Are opportunities discovered, generated or created? What processes are involved in theory and practice? Complexity and emergence. Why are entrepreneurial processes so complex? Motivation, intention, networks, relationships, stakeholders, and experimental/experiential learning. Self and organisational analysis.
- Evaluating opportunities and the emergence of a new venture. Forms of capital (human, social, symbolic, entrepreneurial, and financial), resources and resource based theory (RBT), environmental scanning and trends. Enterprise development and the underlying processes of causation and effectuation. Why is there a need to test out ideas? Thought experiments. Experiments, reflexivity, reflection, organising domains, dominant logic and sensitivity. Concepts of risk, trust, sense making and sense giving, social and human capital. Gaining support for ideas and legitimacy. The role of story/narrative. Change management. Emotional intelligence.

Suggested Reading:

- Carter, S. and Jones-Evans, D., Editors. (2000) *Enterprise and Small Business: Principles, Practice and Policy*. London: FT Prentice Hall.
- Chia, R. (2002). *Entrepreneurial Strategising: The Tacit Mode*. 5th Conference on the Dynamics of Strategy, University of Surrey Guildford, UK, University of Surrey.
- Cobbenhagen, J. (2000). *Successful innovation towards a new theory for the management of small and medium-sized enterprises Jan Cobbenhagen*. Cheltenham, Edward Elgar.
- Cunningham, J. B. and J. Lischeron (1991). Defining Entrepreneurship. *Journal of Small Business Management* **29(1)**.
- Eckhardt, J.T. & Shane S.A. (2003) Opportunities and Entrepreneurship. *Journal of Management* 29(3).
- Flores, F. and J. Gray (2000). *Entrepreneurship and the wired life*. London, Demos.
- Fuller, T. (2004). Is Entrepreneurship Social Foresight. *University of Teesside Professorial lectures*. Middlesbrough.
- Fuller, T. and J. Lewis (2003). Relationships Mean Everything. *British Journal of Management* **13(4)**: 317- 336.
- Fuller, T. and L. Warren (2006). "Entrepreneurship as Foresight: A Complex Social Network Perspective on Organisational Foresight." *Futures, Journal of Policy, Planning and Futures Studies* **38(7)**.
- Fuller, T. & Warren, L. (2006). Order Creating Processes in Entrepreneurial Practice. In Review
- Fuller, T. and L. Warren (in review). "Towards a complex explanation of innovation as order creation through emergence." *Organization Science* (Special Edition on Multi-Level Models of innovation).
- Granovetter, M. (1973). "The Strength of Weak Ties." *American Journal of Sociology* **78(6)**: 1360-1380.

- Nahapiet, J. and S. Ghoshal (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review* **23(2)**: 242.
- Sarasvathy, S. D. (2001). Causation and Effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management review* 26 (2)
- Shane, S. and S. Venkataraman (2000). "The promise of entrepreneurship as a field of research." *Academy of Management Review* **25(1)**: 2 17-226.
- Shaw, E. and S. Conway (2000). Networking and the small firm. *Enterprise and Small Business; Principles, Practice and Policy*. S. Carter and D. Jones-Evans. Harlow, Prentice Hall: 367-383.
- Wickham, P. A. (3rd edition 2005). *Strategic Entrepreneurship*. London, FT Prentice Hall.

Code:	IOT 5021
Title:	Strategic marketing and creative decision making
Type:	Lectures and workshops
ECTS credits:	6
Method of Assessment:	Class Work: 25% Assignment: 75%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Tanya A. Sammut-Bonnici

Learning Objectives:

On completion of this study-unit students are expected to gain insights on creative thinking and the decision making models which involve future trends and which includes an understanding of the following:

1. The role of creativity in business decision making
2. Creativity and naturalistic decision making
3. Intuitive thinking and expert knowledge
4. Divergent marketing orientations
5. Opportunity search in the marketing environment
6. Innovations in segmentation, targeting, and positioning
7. Creative product development and life-cycle strategies
8. Evolution of pricing strategies
9. Development of new distribution channels
10. Creative advertising, sales promotion, and public relations

Description:

Creative thinking techniques are being identified in businesses and industries where predictive decisions are necessary. Creative decision making in commercial settings are analysed in view of high financial stakes, social responsibility, and shifting economic conditions.

The study unit builds on case studies on creative strategies that make the description of the methodology more vivid. In addition to providing information that can be used by professionals in business management, marketing and other fields, the study unit presents an overview of the research approach of Naturalistic Decision Making. It expounds on the knowledge of the strengths people bring to the difficult task of staying ahead of the curve in rapidly evolving economic conditions.

The course content includes emphasis on the importance of anticipating both marketplace and customer needs. It will provide students with an illustration of the proper design of customer-driven marketing strategies, and demonstrates the development of marketing programs that deliver value and satisfaction from a creative stance. The study unit will cover the different approaches to marketing from product orientation to production, market and societal orientations. It will look into diverse market environments and explore the roles of the economic environment, political climates, social implication and technology.

Innovation in marketing is viewed through the perspectives of segmenting consumer and industrial markets. Direct targeting of consumers is covered in respect of recent innovations in internet marketing. Product positioning is explored from both the traditional and emerging perspectives of the 'long tail of demand' – a new development driven by online purchasing.

Creativity is explored in the field of product development and through the life cycle management of services and products. Pricing strategies will be described and discussed, with a focus on recent innovations in variable customer driven pricing in online auctions and peer to peer e-market sites.

Reading List: A selection of readings will be distributed to students.

References

- Crandall, B., Klein, G., Hoffman, R. (2006) *Working Minds: A Practitioner's Guide to Cognitive Task Analysis* Cambridge, MA: MIT Press
- Dibb, S., Simkin, L. (2000), *Marketing Concepts and Strategies*, 4th European Ed, Houghton Mifflin
- Klein, G. (1998). *Sources of power: How people make decisions*. Cambridge, MA: MIT Press.
- Kotler, P., de Bess, F. (2003) *Lateral Marketing: New Techniques for Finding Breakthrough Ideas*. Hoboken, NJ: John Wiley.
- Kotler, P., Wong, V. (2007), *Principles of Marketing*, 3rd European Ed, Prentice-Hall
- Kotler, P. (2003), *Marketing Management*, 11e, Prentice-Hall
- Militello, L.G., Hutton, R.J.B. (1998). Applied Cognitive Task Analysis (ACTA): A Practitioner's Toolkit for Understanding Cognitive Task Demands. *Ergonomics, Special Issue on Task Analysis* 41(11): 1618-1641.

Code:	IOT 5004
Title:	Qualitative and quantitative research methods
Type:	Lectures
ECTS Credits:	6
Pre-Requisite Study Units:	nil
Method of Assessment:	Project (part 1: planning and structure): 33% Assignment (part 2: qualitative): 33% Take home case-study (part 3: quantitative): 33%
Result:	Percentage Mark and Grade
Lecturers:	Dr. Tanya A. Sammut-Bonnici, Dr. Paul A. Bartolo and Professor Mark G. Borg

Learning Objectives:

Part 1: Planning and Structuring the Dissertation Research

In the first part of the study unit students will learn how to:

- Write texts of academic quality
- Develop literature reviews
- Formulate a theoretical framework
- Develop research questions, hypothesis and conjectures
- Prepare a research proposal

Part 2: Qualitative Research Methods

Participants are expected to be able to identify research questions that require a qualitative approach; the major qualitative strategies and techniques for collecting data and their relation to different research questions; how to establish reliability and validity in qualitative research; how to process qualitative data through various strategies of qualitative analysis including the use of ICT, and how to report findings.

Part 3: Quantitative Research Methods

After having followed part three of this study unit, students should be able to:

- identify the basic tenets of quantitative research;
- identify the characteristics of descriptive, correlational and experimental research designs and indicate their advantages and limitations; determine when the use of each of these basic designs is appropriate;
- handle and record responses/data of various types and identify several weaknesses of response styles;
- distinguish between 'statistical significance' and 'practical significance'; explain what various levels of statistical significance (p-values) mean and apply this knowledge to understand research findings;
- compute and explain the meaning and use of basic summary statistics;
- organise data and prepare them for use with the SPSS; list and use several SPSS command lines to run a number of statistical techniques; understand SPSS print-outs of results and interpret findings.

Students will be able to understand: the theoretical underpinnings of quantitative research; the characteristics of descriptive, correlational and experimental research designs; analytical procedures; statistical and practical significance; the application of SPSS features for qualitative research; the development of research findings and conclusions from quantitative analysis.

Description:

Part 1: Planning and Structuring the Dissertation Research

This part of the study unit will introduce the objectives and scope of MA dissertation research. It will provide a benchmark of standards for writing high quality academic texts according to the course requirements. Participants will learn how to assess the best sources for literature review materials in the respective fields. The development of research problems, hypotheses, conjectures and research questions will be addressed. Students will learn to structure the theoretical framework and technical research methodology, and to develop the discussion of the research findings.

Part 2: Qualitative Research Methods

Students will be enabled to recognize and address research questions that require a qualitative approach. It will provide an overview of the variety of qualitative approaches, including action research and protocol and thematic analysis. Participants will develop skills in the design of qualitative inquiry, in qualitative data collection techniques, and in qualitative analysis skills.

Part 3: Quantitative Research Methods

This part of the study unit will aim to equip students with those basic concepts, techniques and skills necessary to plan and conduct rigorous quantitative research.

The emphasis throughout this study unit shall be on active and meaningful student participation. Sessions will involve practical activities and students will learn to integrate both narratives and numbers, that is, both qualitative and quantitative research methodologies.

Reading List:

Main Text

Robson, C. (2002). *Real world research (2nd ed.)*. Oxford: Blackwell.

Bibliography:

- Denzin, N, K., & Lincoln, Y, S. (Eds.) (2000). *Handbook of qualitative research (2nd ed.)*. London: Sage.
- Gibbs, G.R., Friese, S., & Mangabeira, W.C. (2002). Using Technology in the Qualitative Research Process. *Forum: Qualitative Research (Special Issue)*, 3(2) (online journal for qualitative research, with free accessibility on <http://www.qualitative-research.net/fqs/fqs-eng.htm>).
- Jones, S., Wahba, K., Van Der Heijden, B. (2008) *How to Write Your MBA Thesis*, Series in Intercultural and Global Management. Meyer & Meyer
- Miles, M.B., & Huberman, M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook (2nd ed.)*. Newbury Park, CA: Sage.
- Mills, G. (2002). *Action Research: A Guide for the Teacher Researcher (2nd Ed.)*. New Jersey: Prentice Hall.
- Murray, R., (2006) *How to Write a Thesis*, Open University
- Murray, R., (2006) *The Handbook of Academic Writing*, Open University
- Murray, R., (2006) *Writing for Academic Journals*, Open University
- Patton, M.Q. (2002). *Qualitative evaluation and research methods (3rd ed.)*. London: Sage
- Scientific Software Development (2004).
- Atlas.ti features – Overview. (<http://www.atlasti.com/features.shtml>)
- Silverman, D. (1999). *Doing qualitative research: A practical handbook*. London: Sage.
- Strauss, A. L., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.)*. Newbury Park, CA: Sage.
- Yin, R.K. (1994). *Case Study research: Design and methods (2nd ed.)*. Thousand Oaks, CA: Sage.

Code:	IOT 5011
Title:	Creativity and innovation in the media
Type:	Lectures, workshops and distance learning
ECTS credits:	4
Method of Assessment:	Assignment: 100%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Brenda Murphy

Learning Objectives:

- To understand the significant historical developments, and those impacts on a broader social and cultural context.
- To be familiar with significant media models and understand their application
- To recognise and utilise creative strategies to address some of the core issues that emerge as a result of a highly media dependent society.

Description:

The aim of this study unit is to:

1. Provide a historical and theoretical overview of the various media and their complementary core media elements such as advertising and PR, journalism and film, in contemporary society
2. To introduce core models, which are useful in interrogating the function of these media;
3. Examine some case studies where creative strategies have been used in addressing or resolving an issue in the core media elements
4. Highlight how media industries exist within a market led economy
5. Examine how the media portrays the social and cultural aspects of our world
6. Explore how *creativity* and *innovation* could be utilised to address some of the issues and concerns around ‘portrayal’ and ‘representation’

Reading List:

- de Bono, Edward 1973, *Lateral thinking: creativity step by step*. New York: Perennial Library
- de Bono, Edward, 1992 *Serious Creativity: using the power of lateral thinking to create new ideas*. New York, NY: Harper Business,
- Dingli, Sandra M., 2002, *Creative Thinking: An Indispensable Asset for a Successful Future*, Malta University Press
- Green, Andy, 2001 *Creativity in Public Relations (PR in Practice)*
- Green, Andy, *Effective Personal Communication Skills for Public Relations (PR in Practice)* Hall Stuart 2001, *Representation: Cultural Representations and Signifying Practices*.
- Holbrook, David. 1994, *Creativity and popular culture*. Rutherford; London: Fairleigh Dickinson University Press ; Associated University Press.
- Jones, John Philip 1999, *The advertising business: operations, creativity, media planning, integrated communications*. (ed.). Thousand Oaks, Calif.: Sage Publications, 1999.
- McNair, Brian 2003 *News and Journalism in the UK (Communication and Society)* Routledge, London McNair Brian 2002 *Striptease Culture, sex media and the democratization of desire*, Routledge, London Williams Kevin 1998, *Get Me a Murder a Day!: History of Mass Communication in Britain*

Code:	IOT 5023
Title:	Creativity, innovation and new digital technologies
Type:	Lectures, workshops and distance learning
ECTS credits:	6
Method of Assessment:	Class Work: 20% Examination: 80%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Sandra M. Dingli Dr. Tanya A. Sammut-Bonnici

Learning Objectives:

Students will become familiar with the evolution of the Information Communications and Technology Industry (ICT) and understand the following concepts and issues: Technology Driven Creativity; Convergence and Digitisation; Transformation Through Innovation; Evolution of Creativity and Implications for ICT; Evolutionary processes and ecology; New Product Development; Extending Product Life Cycles through Creativity; and ICT Network Dynamics.

Students will be expected to learn about the relevance of creativity and innovation in connection with digital technologies and to apply idea generation techniques to enhance their approach to both their own learning and to the environments in which they operate.

Description:

This study unit looks at the development of ICT and the process of creativity and innovation. The content is based on cutting-edge research on the network economy and the effects of digitisation and convergence as the broad innovation streams in the industry. The study unit will mainly cover the following topics:

Topic 1: Technology driven creativity: The case of convergence and digitisation

1. New technological environments
2. Digitisation and Innovation
3. Convergence and innovation as antecedents of innovation
4. Evolution of ICT products
5. Evolution of ICT networks
6. ICT Challenges

Topic 2: ICT industry's transformation through innovation

1. Broadcasting sector
2. Internet search engines
3. Online marketplace sector
4. Providers of IT solutions
5. Publishing sector
6. Telecommunications sector

Topic 3: ICT product creativity

1. ICT product levels and creative design
 - Product levels and consumer attributes
 - Following, predicting and creating trends
 - Detecting latent demand
2. New product development
 - Idea generation

- Internal ideas
 - External ideas
 - Concept and development testing
3. Extending product life cycles through creativity
- Product life cycles
 - Product extension strategies

Topic 4: ICT network dynamics

1. Innovation diffusion
2. Innovation standards and generations
3. Lock-in and innovation
4. 'Versioning' innovations
5. Critical mass
6. Network effects
7. Innovation evolution vs. revolution

Topic 5: A road map to ICT growth

The road map synthesizes how ICT companies excel at the process of innovation

1. Identifying prospective opportunities
2. Assessing the potential of selected opportunities
3. Beginning the iterative process of execution

Topic 6: ICT case study: Google's creativity and innovation centres

1. Creating a creative environment
2. Incubating innovation
3. Encouraging multiple cultures and diversity
4. Attracting the right personnel
5. Managing the innovation process

Topic 7: Innovation and new digital technologies

1. Digital technology and the accelerated rate of change
2. Identifying creativity and innovation in new digital technologies
3. Applying creativity tools to new digital technologies

Reading List:

- Burgelman, Robert A., Clayton M. Christensen, and Steven C. Wheelwright. *Strategic Management of Technology and Innovation*. 4th ed. McGraw-Hill/Irwin, 2003.
- Christensen, C. M., Scott D. Anthony, and Erik A Roth. *Seeing What's Next: Using the Theories of Innovation to Predict Industry Change*. Boston: Harvard Business School Publishing, 2004.
- Christensen, Clayton M. *Innovation and the General Manager*. Homewood, Ill.: Richard D. Irwin, 1999.
- Christensen, Clayton M. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, Mass.: Harvard Business School Press, 1997.
- Christensen, Clayton M., and Michael E. Raynor. *The Innovator's Solution: Creating and Sustaining Successful Growth*. Boston: Harvard Business School Press, 2003.
- de Bono, Edward (1993) *Serious Creativity: Using the Power of Lateral Thinking to Create New Ideas*
- Inouye, Alan S., Blumenthal, Marjory S. and Mitchell, William J. (2003) *Beyond Productivity: Information, Technology, Innovation, and Creativity* (available on line)
- Managing for Eternity The CEO Refresher, USA, Volume 8, Issue 1.1, 2000.
- McCraw, T. K. *Prophet of Innovation: Joseph Schumpeter and Creative Destruction*. Cambridge, Mass.: Harvard University Press, 2007.
- McCraw, Thomas. "Schumpeter's Business Cycles as Business History." *Business History Review* 80 (Summer 2006): 231-261.
- McGee, J., Sammut-Bonnici, T., *Network Industries in the New Economy*, European Business Journal, Vol. 14, pp. 116-32, 2002.
- Tidd, Joe, Bessant, John and Pavitt, Keith (2005) *Managing Innovation: Integrating Technological, Market and Organizational Change*

Code:	IOT 5006
Title:	Enhancing business performance through strategic innovative design
Type:	Lectures
ECTS credits:	4
Method of Assessment:	Presentation - 40% Assignment - 60%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Ing. Jonathan C. Borg

Learning Objectives:

To provide a theoretical foundation to how the process of *innovative design* can be exploited to positively contribute in improvements to business performance measures such as cost, time, quality and flexibility.

Description:

Topics to be covered include the following:

- The innovation process, design and business performance;
- Sequential design; concurrent design; integrated product development approach;
- Artefacts viewed as technical systems;
- Design problem solving via the basic design cycle;
- Tools and methods for problem analysis, solution synthesis and solution analysis;
- Tools and methods in practice I
- Tools and methods in practice II
- Managing product variety and commonality to enhance business performance;
- Design in industry – patents, CE marking, financing R&D.

References

Design in Business – Strategic Innovation Through Design Margaret Bruce & John Bessant, Pearson Education Ltd ISBN 0 273 64374 6

Integrated Product Development, M. Myrup Andreasen & liars Hein, Institute of Product Development, Technical University, Denmark.

Product Design And Development K. T. Ulrich & S. D. Eppinger, Irwin McGraw-Hill ISBN 0-07-229647-X.

Code:	IOT 5007
Title:	Foresight techniques for creativity and innovation
Type:	Lectures
ECTS credits:	4
Method of Assessment:	Presentation: 30% Assignment: 70%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Jennifer Harper (coordinator), Ms. Lisa Pace, Dr. Gordon Pace and others

Learning Objectives:

The course is aimed at instilling an improved understanding of:

- the distinction between futures, forecasting and foresight approaches;
- the importance of long-term, open participatory approaches in overcoming context and path-dependency in policy-making (particularly research and innovation)
- the growing convergence of public and private rationales in the use of foresight
- the growing importance of foresight at regional and local levels

Description:

This study unit will provide an introduction to the use of foresight methodologies as alternative approaches to encouraging creativity and innovation. The introductory sessions will focus on the rationale for the use of foresight as an innovative policy-making tool and for developing strategic intelligence. A historical overview of the use of foresight in advanced economies worldwide will be provided complemented by the more recent use of foresight in economies in transition and small countries. The study unit will analyse a number of international and local case studies on the use of foresight for creativity and innovation. The following aspects will be covered:

- Introduction to foresight rationale and methodologies: A historical overview of the use of foresight worldwide
- The role of context and creativity in foresight
- Foresight as a strategic tool for policy-making and as an educational tool for creativity and innovation
- Managing a foresight exercise
- The role of communications in foresight
- Case study in information and communications technologies
- Case study in marine science sector
- Case study in biotechnology
- Foresight in SMEs
- Case study in careers

Background

Foresight is a systematic, participatory, future-intelligence-gathering and medium- to long-term vision-building process aimed at present-day decisions and mobilising joint actions. Foresight arises from a convergence of trends underlying recent developments in the fields of 'policy analysis', 'strategic planning' and 'future studies'. It brings together key agents of change and various sources of knowledge

in order to develop strategic visions and anticipatory intelligence.

Regional foresight is the implementation of the five essential elements of foresight:

- anticipation,
- participation
- networking
- vision
- action

Foresight can be applied to a huge range of topics (scientific, industrial, demographic, social, political and cultural). While it can be used to inform policymaking, build networks, and enhance local capabilities for tackling long-term issues, it is not a magic solution that can solve all social, economic or political problems of regions.

Foresight is a very evocative label for the rise to prominence of participative methods and long-term strategic futures techniques, in the wake of more traditional ways of informing policy planning. It is currently highly-topical, but whether or not the label persists is irrelevant to the real trends which are radically changing delivery-timescale and format requirements for information on future threats and opportunities which decision-makers require. Foresight, as a means to an end, is well adapted to these changing requirements. It has proven itself at national level, and has begun to do so too at regional and other territorial levels.

Common features of Foresight include:

- a long-term orientation, the examination of a wide range of factors,
- the drawing on widely-distributed knowledge,
- the institutionalisation and creation of networks and the use of formal techniques/ methods.

Bibliography:

Bell, W. (1997) *Foundations of futures studies*, 2 vols. Transaction Publishers, New Brunswick and London, 1997. ISBN 1-56000-271-9 and 1-56000-281-6

Gavigan, J. P. and F. Scapolo (1999). Matching methods to the mission: a comparison of national Foresight exercises. *Foresight* 01(06): 495-517.

Georghiou, Harper, Keenan et al (2008) *The Handbook on Technology Foresight*, Elgar

Godet, M. (1993). *From anticipation to action - A handbook of strategic prospective*. Paris, UNESCO.

Godet, M. (2001). *Creating Futures - Scenario Planning as a Strategic Management Tool*. London, Economica.

Keenan, M, I Miles, F Fahri and D Lecoq, (2001) *Creating Vision in the Regions: a framework for organising Regional Foresight*, IPTS Report no 59 Nov 2001 pp6 –12

Linstone, H. A. and M. Turoff, Eds. (1975). *The Delphi method: Techniques and applications*. London, Addison-Wesley Publishing Company.

Local Government Association Futures Toolkit, *The future: why consider it?*

Makridakis, S., S. Wheelwright, et al. (1983). *Forecasting: methods and applications*. New York, John Wiley & Sons.

Martino, J. P. (1993). *Technological forecasting for decision making*, -3rd ed. New York, McGraw-Hill.

Masini Barbieri, E. (1993). *Why futures studies?* London, Grey Seal Books.

I Miles (1997) *Technology Foresight: Implications for Social Science*, CRIC, University of Manchester, Working Paper no 3 ISBN 1 84052 002 7 <http://les1.man.ac.uk/cric/>

S.W. Popper, C. S.Wagner et al, (1998) *New Forces at Work: Industry Views Critical Technologies*, RAND, Santa Monica, CA, .

Schartz, P. (1998) *The art of the long view: planning for the future in an uncertain world*, Wiley, Chichester etc., ISBN 0-471-97785-3 121

Slaughter, R. A. (1996). The knowledge base of futures studies as an evolving process. *Futures* 28(9): 799-812.

Van Der Heijden, K. (1996). *Scenarios: The art of strategic conversation.*, Chichester, John Wiley

RELEVANT WEB SITES

- <http://cordis.europa.eu/foresight/home.html>
- <http://www.foresight.gov.uk>
- <http://www.eforesee.info>
- <http://www.unido.org/doc/45321>
- <http://www.efmn.info>
- <http://www.futur.de>
- <http://millenium-project.org>
- <http://www.forlearn.jrc.es>
- <http://www.lga.gov.uk/lga/toolkit/index.htm>
- <http://www.gbn.org/>
- <http://gwforecast.gwu.edu/index.asp>

Code:	IOT 5024
Title:	Creativity: Psychological perspectives
Type:	Lectures, workshops and distance learning
ECTS credits:	4
Method of Assessment:	Reflective Diary: 30% Examination: 70%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Ms. Leonie Baldacchino and Ms. Adriana Tedesco

Learning Objectives:

Students who complete this study unit are expected to demonstrate an understanding of the various psychological processes that underlie creativity, as well as of how creativity results from interplay between these psychological processes, personal characteristics and contextual factors.

Description:

This study unit is designed to provide students with in-depth knowledge of the various psychological processes that mediate the relationship between the individual and contextual factors involved in creativity. Students will learn about the typical characteristics of creative people and about how creativity is influenced by environmental factors. They will explore the relationship between creativity and various psychological components including motivation, perception, intelligence, and memory.

Topics to be covered include the following:

Introduction: Historical Overview and Definitions

A brief historical overview of creativity will lay the foundation to introduce the central concepts which students are to explore in further detail throughout this study unit.

The Creative Process, the Creative Product, the Creative Person and the Creative Environment

A discussion of the creative process will focus on the stages involved in creativity and will lead to a definition of what constitutes a creative product. The characteristics of creative people will be described together with the environmental influences on creativity to help students understand that creativity results from interplay between personal traits and external factors. This will shed light onto the issue of nature and nurture as applied to creativity.

The Psychological Components of Creativity

Students will develop in-depth knowledge of the various psychological processes that mediate the relationship between the individual and contextual factors involved in creativity. They will explore the relationship between creativity and various psychological components including intelligence, sensation, perception and attention, memory and learning, cognitive processes and problem solving, motivation and emotions, personality and the self.

Creativity and Mental Health

This will shed light onto the relationship between mental illness and creative response. Psychological conditions, brain damage, self-destructive behaviour and psychiatric disturbances will be analysed, in view of their connection to creativity. Furthermore, students will be provided with an understanding of the link between well-being and creativity, with particular emphasis on self-disclosure, self-regulation, depression, stress and adaptation.

Creativity Testing and Creativity Research

The various ways of conceptualizing creativity for measurement purposes will be outlined and the salient issues pertaining to the measurement of creativity (creativity tests), including problems of reliability and validity, will be discussed. An overview of the areas of research in the creativity domain, including cognitive research, clinical research, developmental research and psychometric research, will also be investigated.

Reading list:

- Amabile, T. (1996). *Creativity in context*. Oxford: Westview Press.
- Choi, J. (2004). Individual and contextual predictors of creative performance: The mediating role of psychological processes. *Creativity Research Journal*, 16(2-3), 187-199.
- Csikszentmihalyi, M. (1997). *Creativity: Flow and the psychology of discovery and invention*. NY: Harper Perennial.
- Gardner, H. (2006). *Multiple intelligences: New horizons*. NY: Perseus Book Group.
- Hughson, N. & Hughson, R. (2003). *Psychology of creativity*. Arizona: Amazing Books
- Runco, M. (2004). Creativity. *Annual Review of Psychology* (55), 657-687
- Sternberg, R. (1999) (ed.). *Handbook of creativity*. UK: Cambridge University Press.
- Sternberg, R. (2003). *Wisdom, intelligence, and creativity synthesized*. UK: Cambridge University Press.
- Walton, A. (2003). The impact of interpersonal factors on creativity. *International Journal of Entrepreneurial Behaviour and Research*, 9(4), 146-162.
- Weisberg, R. (1993). *Creativity: Beyond the myth of genius*. NY: W.H. Freeman

Code:	IOT 5025
Title:	Innovation diffusion: Selection, complexity and probability dynamics
Type:	Lectures and workshops
ECTS credits:	4
Method of Assessment:	Class work: 30% Assignment: 70%
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Tanya A. Sammut-Bonnici

Learning Objectives:

Students who complete this study unit are expected to demonstrate an understanding of how creative output survives competing ideas and how it is selected in a population of adopters. Students will learn how innovations diffuse amongst a population and how they evolve within groups, organizations, societies, and nations.

Description:

What happens to a creative idea once it is generated? How is it selected amongst competing ideas? How does it diffuse into a population to become accepted? How do creative ideas and practices evolve and develop? This study unit is a comprehensive introduction to the key language and concepts of complexity and how they relate to the new world of creativity and innovation. It explores the profound yet practical implications of these concepts, and demonstrates how they are complex adaptive systems to which a whole new set of management ideas now apply.

Students are encouraged to make their own path through the maze of concepts of creative idea selection, retention and proliferation. The practicality of the study unit is enhanced by extensive case studies, audio visual material and interactive learning.

Survival of the Fittest Creative Idea

Creativity and Genetic Analogies (Gradual Innovation, Punctuated Innovation)
Survival of Innovative Ideas and ICT Products (Variation, Retention, Selection)
Exploration of the Theories of Selection:

- Natural selection
- Probability
- Complexity

How Innovations Survive

Systems
Complexity
Complex adaptive systems
Networks and hierarchy

Ideas as Genes and Viruses

Dialogue memes
Metaphor
Receiver-based communication
Perspectives
Possibility space

Evolution and Co-Evolution of Creative Ideas

Co-evolution

Evolution of co-operation

Fitness landscape

Autopoiesis

Reading list:

Arthur, B. (1989). 'Competing Technologies, Increasing Returns, Lock-In By Historical Events,' *Economic Journal*, **99**, pp. 116-131.

Arthur, B. (1996). 'Increasing Returns and the New World of Business,' *Harvard Business Review*, **74**, pp. 100-109.

Batram, Arthur 1999. *Navigating Complexity: The Essential Guide to Complexity Theory in Business and Management*. London: Industrial Society.

Capra, Fritjof 1997 (1996). *The Web of Life: A New Synthesis of Mind and Matter*. London: Flamingo.

Moore, J.F. (1993). 'Predators and Prey: A New Ecology of Competition,' *Harvard Business Review*, **71**, pp. 75-86.

Sammut-Bonnici, T., Wensley, R. (2002). 'Darwinism, Probability and Complexity - Transformation and Change Explained through the Theories of Evolution,' *International Journal of Management Reviews*, **4**, pp. 291-315.

Code:	IOT 5026
Title:	Innovation in organisations
Type:	Lectures, workshops and distance learning
ECTS credits:	4
Method of Assessment:	Presentation: 20 % Assignment: 30 % Examination: 50 %
Pre-Requisite Study Units:	nil
Result:	Percentage Mark and Grade
Lecturer:	Dr. Tanya A. Sammut-Bonnici and Dr. Sandra M. Dingli

Learning Objectives:

- To understand the development of innovation principles stemming from Nietzschean concept for disruption and creativity to Schumpeter's notions influenced by the Austrian School of Economics.
- To provide students with skills to conduct strategic assessments and to develop innovation strategies in organisations.
- To apply creativity and innovation processes in product development.
- To analyse the complexity of alliance formation necessary for multi-partner product and process development

Students will be expected to recognise the conditions that facilitate organisational creativity and innovation and to understand how they can be fostered and implemented and, vice-versa, to identify obstacles to creativity and innovation which may exist at various levels within an organisation.

Description:

The course addresses the issue of how to apply creative thinking to foster innovation in business organisations in times of discontinuous change. The possibility of conducting innovation audits in organisations to assess factors that enable and factors that inhibit innovation will be discussed. Bridging the gap that many perceive between the classroom and the world of business is a key concern of many organisations and firms. The study unit will include a blend of theoretical material (to establish an academic underpinning) and practical exercises to encourage experiential learning.

The program will cover the following areas.

1. **Principles of Innovation Management:** Schumpeterian innovation principles, Christensen's Disruptive innovation theory, sources of discontinuity.
2. **Strategic Approaches:** Rationalist and incrementalist strategies, Dynamic Capabilities of Firms, Porter's framework,
3. **Market Innovations:** Product differentiation, Architectural Products, Technological Products, Commercialization, Forecasting Diffusion of Innovation
4. **Collaboration and Alliances:** Forms of collaboration, Effect of technology and organization, Managing alliances

5. **Assessing the level of Innovation in Organisations:** barriers that inhibit creativity, how these can be overcome and factors that facilitate innovation in organisations
6. **Case Studies:** will be applied for the above topics

Reading List

- Christensen, C.M. (1997). *The Innovator's Dilemma*, Harvard Business School Press, Boston, MA.
- Christensen, C.M., Overdorf, M., MacMillan, I., McGrath, R., (2001). *Harvard Business Review on Innovation*. Cambridge MA.
- Christensen, C.M., Overdorf, M. (2000), Meeting the challenge of disruptive change, *Harvard Business Review*, Vol. 78 No.2, pp.66-77. Cambridge MA.
- Christensen, C.M., Raynor, M.E. (2003). *The Innovator's Solution*. Harvard Business School Press, Boston, MA.
- Drucker, P. (2006). *Innovation and Entrepreneurship*. Harper Row, New York.
- Goodman, M.R.V., (1997). *Creative Management*. Prentice Hall, London.
- Lumsdaine, Edward, Lumsdaine, Monica (1995) *Creative Problem Solving: Thinking Skills for a Changing World*, New York: Mc Graw Hill Inc.
- Majaro, Simon (1989) *The Creative Gap*, Longman Trade/Caroline House.
- Tidd, J., Bessant, J. & Pavitt, K. (2005). *Managing Innovation: Integrating Technological and Organization Change*. 3rd ed. Hoboken: Wiley. London
- Tidd, J., Bessant, J. & Pavitt, K. (2007). *Innovation and Entrepreneurship*. Wiley. London.

Code:	IOT 5027
Title:	Creativity and innovation in education, science and technology
Type:	Lectures
ECTS credits:	4
Method of Assessment:	Presentation: 20% Assignment: 80%
Result:	Percentage Mark and Grade
Lecturers:	Dr. Suzanne Gatt and Ms. Shirley Pulis Xerxen

Learning Objectives:

Students will be expected to:

- explore different theories about creativity in education
- learn about the characteristics of creative learners/individuals
- explore barriers to creativity in education
- discover the evolution of theories about the creative process and their relevance to the development of creativity in education
- appreciate that science and technology advancement is the outcome of creativity and innovation
- understand that science and technology is a human enterprise and consequently can be fallible
- realise that the uncertainties within science and technology allow for advancement through creativity
- appreciate that scientists are humans with their personal interests as well as their different creative input to their work
- be aware of the major role that creativity plays in innovative solutions to scientific and technological problems.

On completion of this study unit students will have learnt about the role of creativity in education, science and technology and about different strategies for implementing creativity within a curriculum, in particular one that helps to instil creativity and innovation in future scientists. Students will, moreover, be in a better position to appreciate the creativity and innovation provided by scientists involved in research and development.

Description:

Creativity within education is a complex concept with multiple meanings. Albeit being considered a desirable outcome, often regarded as potentially the most powerful means through which learners have the opportunity to open the gate of a better world, it is important to acknowledge that an established, universally accepted definition of creativity in an educational setting does not exist.

In practice, scientists need to be creative and innovative in coming up with solutions and mental models to explain phenomena and to develop more advanced technological machines to suit our needs. Science and technology form part of scientists' activities and work. They are the vehicles that push industry forwards. Companies are continually under pressure to be on the forefront, to come up with new ideas and new technologies. This can only be achieved through the creativity and innovation provided by the scientists involved in research and development.

Being creative and innovative is not easy. It is thus important to promote these skills in education in order to help future scientists (and everyone else) to fulfil their creative potential. Traditional training of scientists, as too often occurs in education, usually instils convergent thinking, leaving little space for alternative solutions. This is an aspect of science education that urgently needs to be addressed.

This study unit will focus on the issues highlighted above. The traditional view of science and technology education, and particularly that of scientists, will be challenged. The stereotypic image will be rebutted through a number of practical examples of great innovations and advancements in science both historically and current issues.

Reading list:

Amabile, T. M. (1996). *Creativity in Context: Update to The Social Psychology of Creativity*. Oxford: Westview Press.

Chalmers A.F., (1982), *What is this thing called science?* Milton Keynes: Open University Press.

Cropley, A. J. (2001) *Creativity in Education and Learning: A Guide for Teachers and Educators*. London: RoutledgeFalmer

Popper, K., (1959), *The Logic of Scientific Discovery*, London: Routledge

Popper, K., (1974), *Unended Quest*, London: Routledge

Code:	IOT 5030
Title:	Dissertation
ECTS credits:	30
Result:	Percentage Mark and Grade

Learning Objectives:

Students completing the dissertation will be able to:

- Communicate complex professional and academic issues to both specialists and layperson.
- Formulate and analyse complex scholarly issues independently, systematically and critically.
- Critically appraise various methods of analysis.
- Work as a member of a community of learners and independently.
- Continue own competence development and specialisation

Description:

The overall aim of the dissertation is to allow students to unify and extend their understanding of the subject as developed in the taught part of the programme by pursuing an independent research project on a chosen topic. Students completing the dissertation will have demonstrated:

- Detailed understanding of a particular idea of relevance to their degree.
- In-depth knowledge of the relevant literature on the subject matter of the dissertation.
- An ability to undertake sustained critical analysis.
- An ability to conduct research.
- An understanding of research work, including research ethics.

The workload is approx. (600 – 800) hours.