# Competence and Learning outcomes to design a curriculum

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## Harmonisation

Harmonization is a **mutual** recognition and acceptance of the contents and quality of educational programmes and diplomas of agreed parties as legitimate, comparable and equivalent.



## Context

 European Credit Transfer System since 1989 – Pilot for recognition of mobility - limited impact

Today:

- ECTS: European Credit Accumulation and Transfer System
  - Objectives:
    - Protection of Students
    - Tool to support design, description, delivery and award of higher education programmes and qualifications
    - System to facilitate recognition of study-components and degrees
      - Also placements/internships
      - Achieved abroad
      - And/or in the home country
    - Increases transparency
    - Can be applied to formal / non-formal and informal learning
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# **Learning Outcomes**

- Basis
  - to identify the workload
  - to allocate credits
- Link
  - to assessment
  - to teaching and learning methods
- Characterise
  - the profile of the programme / educational component
- Respect
  - Shareholders' views
- Credits
  - Evidence of successelpouve, Bologna expert

## DEFINITIONS

Aims, objectives and learning outcomes

Output-based rather than input-based

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## **From INPUT to OUTPUT**

- From Professors and the teaching
  - Aims : statement of input, what the teacher intends to cover (Rq: objectives is a confusing word, aims is easier to understand)
- From Students and the learning
  - Learning outcomes : statement of output, what the student is expected to learn (what the student is able to know, to be or to do after completing the module)

### Learning Outcomes, definition (D.Gosling and J. Moon)

Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of learning. They can refer to a single unit/module or else to a full programme of study, for example a first or second cycle programme.

Learning outcomes specify the minimum requirements for the award of credit.

## **Definition of LO**

To Know

What should the learner achieve in terms of knowledge?

Be able to do What can a learner demonstrate that he

has achieved?

Learning outcomes state what the learner is expected to know and able to do at an identified stage of the learning process.

# Principles

- The L.O. are linked to assessment criteria
- L.O. must be placed within the hierarchy of the qualification levels (see Dublin descriptors later and EQF)
- Any given module can be assigned to only one level
- L.O. identify the essential learning to be achieved to merit the award of credit
- L.O. are written to represent essential learning (to get the minimal marks. Higher levels express the quality of achievement).

## Example 1/3

**PRODUCTION AND OPERATIONS MANAGEMENT (Ma, 6 ECTS)** 

• Aims

The goal of the course is to introduce the student to the design, analysis, reengineering, optimisation and functional control of Manufacturing-Industrial and Service companies, and to highlight the intense need for effective management of the constrained resources of their constituent systems.

## Example 2/3

**PRODUCTION AND OPERATIONS MANAGEMENT (Ma, 6 ECTS)** 

 Expected learning outcomes the student will understand the organizational structure and the various components, subsystems and functions of a Production or Service Provisioning System, and will gain significant knowledge on the problems arising during their design and operation, as well as on the problem-solving methods through analytical and computational techniques.

### Example 3/3

PRODUCTION AND OPERATIONS MANAGEMENT (Ma, 6 ECTS) Content

The topics of the course cover all complex and interrelated business processes inherent in the systems operation, e.g., product and process design, forecasting, planning and scheduling, facility location and layout, and quality control. Finally, the course provides:

a) a classification of the vertical markets with their individual characteristics,

b) a definition of the practical and theoretical problems encountered in each of them,

c) an analysis of the modern strategic and tactical approaches for effective management.

#### Mass Spectroscopy (Ma, 5 ECTS) 1/3 • COURSE DESCRIPTION

The course covers aspects of molecular mass spectrometry including the most recent developments in instrumental design, techniques and understanding of mass spectral processes. The methods available for the introduction of analytical samples are presented, and the advantages and disadvantages of these methods considered. The different types of mass analysers, their working principles and performances are discussed. Current software tools for data-dependent analysis and online techniques are described. Examples are presented of the application of mass spectrometric techniques in different areas of chemistry

## Mass Spectroscopy (Ma, 5 ECTS) 2/3 AIMS, The aims of this unit are:

- To build upon and extend the theoretical and instrumental concepts introduced during the bachelor degree programme.
- To develop the competence and confidence of the students in mass spectrometry.
- To highlight modern advances in instrumentation and techniques within mass spectrometry.
- To identify appropriate instrumentation for particular applications.

## Mass Spectroscopy (Ma, 5 ECTS) 3/3

**INTENDED LEARNING OUTCOMES**: After completing this unit the student should be able to:

- Discuss in a comprehensive way the methods available for the introduction of samples to a mass spectrometer,
- Identify methods for ionisation and their advantages and disadvantages,
- Review critically the available types of mass analysers,
- Discuss the use of software in obtaining and analysing mass spectral data,
- Identify the most suitable instrumentation for specific applications and describe the extent and limitations of the data obtained,
- Interpret mass spectral data and present the conclusions drawn in written and oral form,
- Explain to non-specialists how mass spectrometry can be expected to provide valuable information in different areas of chemistry and related disciplines Logna expert

# **Outcomes-based** approach

ADVANTAGES (Ref: Adam 2004)

- Coherence in curriculum design
- design & delivery
- Increases flexibility (formal and non-formal)
- Improves progression routes to qualifications (and ways to learn)
- Increases transparency for stakeholders (e.g. students, employers)
- Assures consistency of quality and standards

# **DISADVANTAGES**

- Rationalistic model (reduce the learning process in a too specific or too general model, assume that the teacher can pre-plan what the students will learn)
- Reductionist process
- Stifles creativity
- Variable impact on staff and students
- Learning can be 'unpredictable and indefinable' – but learning outcomes must be measurable

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#### Some good practices

- To avoid plagiarism,
  - LO should be:
    - Students are expected to demonstrate the origins of their ideas by referencing sources used in the essay
  - Assesment criteria:
    - Accurate use of the standard referencing styles within the text for all texts used
    - Precise and accurate bibliography
- To avoid a too rationalist plan,
  - LO should be:
    - Students are expected
      - to apply theory critically to analyse their professional experience,
      - Draw creatively on experience to devise work which integrates art forms,
      - Use a self-reflective approach to devising, developping and delivering project work

## Some good practices

One key of the success,

- Make sure that the students acquire a clear view of what they are expected to be able to do
- Involve the students, discuss the L.O., tutoring actively and come back to them throughout the course.

## How to write L.O.

- Achievable (within the time available at the level of learning the students are at),
- General, not too specify,
- Not too much (5 to 8, < to 10),</li>
- Unambiguous (understood by all, not liable to be misinterpreted),
- Signifiant (a major achievement expected, capability, task or in process to be able to do,
- Assessable (in manageable way),
- Essential (to pass the module).

# More examples 1/2

- Ba in education : At the end of the module the learner is expected to be able to
  - explain the more common reasons for difficult behaviour in primary school children in class situation, indicating standard techniques for ameliorating that behaviour
- Ma in English litterature : At the end of the module the learner is expected to be able to
  - Demonstrate detailed understanding of the influences of the historical and social context within which the chosen text is set, both from the study of the text itself and from the study of other contemporary literature.

## More examples 2/2

- Ba in Physics : At the end of the module the learner is expected to be able to
  - Perform correctly calculations on wave functions and in the solution of the Schroedinger equation for a range of one-dimensional problems
- Ma in Physics : At the end of the module the learner is expected to be able to
  - Describe and explain the function of the basic devices of optoelectronics; optical fibres; liquid crystal displays; bi-polar and surface field effect transistors and MOS light emitting diode.

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# Links between ECTS and Learning Outcomes

Part III

## **ECTS and Learning Outcomes**

#### ECTS credits

- are a quantified measure of the learning outcomes
- reflect upon the likely investment of energy and time = measured and expressed as workload to achieve the specified learning outcomes

(orientation: the typical profile of learner in that environment. This does not exclude that individual learners may need much more or much less enery and time to achieve the learning outcomes)

- reflect assessed learning outcomes
- document that the learner has achieved
  - the learning outcomes of components of formal learning programme
  - the learning outcomes of the whole programme (degree)

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## **ECTS and Learning Outcomes**

- These learning outcomes may also be achieved through non-formal and informal learning
  - Recognition of prior learning (APL)
  - Recognition of prior and experiential learning (APEL)

## **ECTS and Learning Outcomes**

- Credits on their own don't mean anything
- they receive their value through the learning outcomes and the respective level.
- Learning outcomes on their own have a meaning,
  - in particular in relation to qualifications frameworks.

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#### ECTS, Learning Outcomes, Competences

# • **Competences** are more than the sum of learning outcomes.

- They may be reflected in a final thesis, but also may be revealed in the professional life or in any situation of normal life after graduation. To this extent, competences may not be reflected by credits.
- In other words:
  - In formal teaching and learning programmes only those competences may be stipulated and documented by credits which can be assessed.
- These competences are called learning outcomes within the context of this session.

## **The Promise**

#### What?

- A learner can achieve the *learning outcomes (LO)* designed for a learning activity...
  - LO= "Statements of what a learner is expected to know, understand, and / or be able to do at the end of a period of learning"
- How?
- by investing time and effort his workload WL) WL= "A quantitative measure of all learning activities that may be feasibly required for the achievement of the learning outcomes"

# Challenge

- Qualifications have to be characterised by Learning Outcomes which are described unambiguously to allow for:
  - Evidence of compability between the various national, sectoral... and European qualifications frameworks
  - Reliable validation of national frameworks

## **Credits are Relative**

- In a formal programme the ECTS credits are always related to an identified level of a qualification
  - e.g. Bachelor, Master...in the EQF-HE or level 1-8 in the EQF-LLL
- or even a sub-level
  - e.g. first stage in a Bachelor-programme where this part / module forms a step toward a qualification
- The levels are described and specified by learning outcomes according to the qualifications framework (national, European...)





#### **HEI Governance**

-Whom should the HEI serve?-How are the purposes determined?

## LO reflect

# Institutional purpose

-Institutional values -Mission Statement -Objectives

Stakeholders' expectations -Whom does the institution serve?

#### **Cultural context**

Institutional

-Which purposes

should be prioritised?

ethics

-Why?

-Which purposes are prioritised?-Why?

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# Sequence for programme and module development

- To provide a coherent approach to the design of modules in Higher Education, the main components of this are:
  - Level descriptors
  - Learning outcomes
  - Assessment criteria
  - Assessment procedures
  - Teaching strategies

## Module

#### Definition

 A module is a self-contained, formally structured learning experience with a coherent and explicit set of learning outcomes and assessment criteria.

#### Require

- Define learning outcomes
- Allocate credits

#### Facilitate

- Design of individual study-programmes (profiles)
- modularisation
- Different routes (learning pathways) to identifiable degrees, certificates, profiles etc.

## Steps for designing a curriculum<sup>2</sup>

Définir les "résultats de formation" et les compétences Define the learning outcomes and competences

<sup>2</sup> according to the Tuning approach

 Identifier les compétences génériques et leur pertinence dans un monde en mutation

 Parvenir à un consensus sur les compétences spécifiques et leur valeur pour identifier chaque domaine

• Identify the generic competences and their relevance in a changing world

• Build consensus on the specific competences and their value to identify each subject area

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Définir

Identifier

**Construire** le

**Consulter les différents acteurs sociaux (importance réalisation)** 

Consult the different social stakeholders (importance – achievement)

Define

Consulter

Identify

Build consensus

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Define **Analys**e Identify Consult Build consensus

Analyser les résultats de la consultation et de redéfinir les différentes formations

Analyse the results of the consultation and redefine the different degrees

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Design the professional profiles and build consensus on the most relevant competences for each of them, combining both what is common for academic recognition and what is different (the specific features)

Concevoir les profils professionnels et de construire un consensus sur les compétences les plus pertinentes pour chacun d'eux, combinant à la fois ce qui est commun pour la reconnaissance académique et ce qui est différent (les caractéristiques spécifiques)

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Design

Define

Consult

Analyse

Identify

**Build consensus** 



Measure the required student workload to reach competence levels (Credits)

Mesurer la charge de travail des élèves nécessaire pour atteindre les niveaux de compétence (crédits)

Develop the teaching and learning processes of competences

Développer les processus d'enseignement et d'apprentissage des compétences

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Design

Build consensus Develop

Define

Measure

Consult

Analyse

Identify

Formulate the required assessement processes

Formuler les mécanismes nécessaires EVALUATION

Design

Develop

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Førmulate

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Define

Measure

Consult

Analyse

Identify

Build consensus



 Incorporate the learning competences and outcomes in the programme quality enhacement

 Incorper un système cohérent fondé sur des références communes a été développé conjointement.



# Sequence for programme and module development

- To provide a coherent approach to the design of modules in Higher Education, the main components of this are:
  - Level descriptors
  - Learning outcomes
  - Assessment criteria
  - Assessment procedures
  - Teaching strategies

#### **Student-centred learning and teaching**

#### **Focus:** Increase Student Motivation and Achievement

- Vary teaching and learning methods in line with all learning outcomes
  - Lecture, seminar, laboratory, case-studies...
  - Small Groups (independent and dependent)
  - Individual-work (independent)
- Knowledge is needed but it is in particular essential for being able to acquire all other skills and competences
- Students today are not better or worse than in the past. They have different:
  - Backgrounds
  - Socialisation
  - Interests

And there are many more students of an age-group (~5% versus 50% in ~60 years) – massification versus Humboldt

Finally, the student must have learned to learn

#### Assessment

#### **Teacher centred**

Principal guideline: selection, stress, dominating, learn for the exam,

#### Learner centred

 Principal guideline: supporting, encouraging, respecting, learn for yourself



Find out what the student knows exam is a by-product

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## Learner centred examinations

#### CRITERIA

suitable acceptable feasible sustainable

#### **OPTIONS**

- Туре
  - written, oral
    - on-line/off-line / videoconferencing / Tel.-Skype...

#### • Form

- Written exam
  - Closed-book / open-book
  - Multiple Choice, Gaptest, Essay, Case study...
- Presentation / Homework
  - with/without Presentation, Debate
  - Minutes taken...
- Discourse, Colloquium (open/closed)...
- Timing



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## Learner centred examinations

#### **SMART-Criteria**

- Specific
- Measurable
- Suitable
- Relevant

#### • Timing

#### MEANS

- Unambiguous
- Identifiable / feasible
- Acceptable / attractive / demanding / achievable
- Realistic, learning outcomes related
- Defined time

#### Assessment criteria

#### **SMART CRITERIA**

- Relevant versus measurable
- Measurable versus suitable / fair
- Relevant / Realistic versus demanding / challenging
- Suitable versus timing

#### **LEARNING OUTCOMES**

- Ability to work in teams
  Group work?
- Ability to express in a foreign language
  - Lectures were in the native language
- Ability to speak/express
   Written exam?
- Problem solving
  - Bachelor thesis (6 weeks)

### **Assessment Requires**

- Forms / Types
  - Written
  - Oral
  - On-line
  - Theoretical
  - Practical
  - QA
  - Report
  - Essay...

SMART Criteria eg
 Weighting

- Context (5%)
- Research Question (10%)
- Methodology (15%)
- Analysis (20%)
- Conclusion (20%)
- Recommendations (20%)
- Literature (5%)
- Presentation, Language, Quotation (5%)

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