

Course guide

410203 - AEM2-TEC - Learning and Teaching Technology in Secondary Education II

Last modified: 18/09/2023

Unit in charge: Barcelona School of Informatics
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN SECONDARY AND UPPER SECONDARY EDUCATION, VOCATIONAL TRAINING AND FOREIGN LANGUAGE TEACHING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 8.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: HERMINIO MANZANO BOJADOS

Others: Segon quadrimestre:
HERMINIO MANZANO BOJADOS - TEC1
CRISTINA SIMARRO RODRIGUEZ - TEC2

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEME10. (ENG) Adquirir criteris de selecció i elaboració de materials educatius.
CEME4. (ENG) Conèixer els desenvolupaments teòric-pràctics de l'ensenyament i l'aprenentatge de les matèries corresponents
CEME9. (ENG) Conèixer estratègies i tècniques d'avaluació i entendre l'avaluació com un instrument de regulació i estímul a l'esforç.
CEME7. (ENG) Fomentar un clima que faciliti l'aprenentatge i posi en valor les aportacions dels estudiants.
CEME8. (ENG) Integrar la formació en comunicació audiovisual i multimèdia en el procés d'ensenyament-aprenentatge.
CEME5. (ENG) Transformar els currículums en programes d'activitats i de treball.

Generical:

CG6. (ENG) Aprenentatge autònom: detectar deficiències en el propi coneixement i superar-les mitjançant la reflexió crítica i l'elecció de la millor actuació per ampliar aquest coneixement.
CG3. (ENG) Comunicació eficaç oral i escrita: comunicar-se de forma oral i escrita amb altres persones sobre els resultats de l'aprenentatge i de l'elaboració del pensament, i participar en debats sobre temes educatius.
CG4. (ENG) Treball en equip: ser capaç de treballar com a membre d'un equip interdisciplinari i contribuir a desenvolupar tasques i projectes amb pragmatisme i sentit de la responsabilitat.
CG5. (ENG) Ús solvent dels recursos de informació: gestionar l'adquisició, l'estructuració, l'anàlisi i la utilització de recursos diversos i tecnologies de la informació per a l'ensenyament-aprenentatge. Aplicar les TIC en l'activitat docent i transformar la informació en coneixement (TAC) a través del disseny d'activitats o accions que repercutiran en l'alumnat.

TEACHING METHODOLOGY

- Interactive classes
- Use of the virtual campus.
- Team work.
- Individual work.
- Case study and practical work in the technology classroom individually and in teams, if possible.
- Teaching units and schedules.
- Mechanisms linking the theory and the work done in the Practicum.
- Oral presentation of Technology topics.



LEARNING OBJECTIVES OF THE SUBJECT

After completing the course, students will be able to:

- To choose the most appropriate didactic methodologies to develop the curriculum of Technology and Digitization in 1st, 2nd and 3rd ESO, Digitalization in 4th ESO and Industrial Technology, Programming or Robotics in high school.
- Designing didactic strategies that allow attention to the diversity of students in the field of technology and design universal learning techniques.
- Have available didactic resources, materials, software and TAC in general for the work and development of the Technology curricula and know how to use them properly.
- Develop teaching, learning and evaluation activities in the field of technology.
- Apply techniques and evaluation strategies in the field of technology in secondary and high school.
- Develop programming and teaching units with a competence vision in the field of technology in secondary and high school.

STUDY LOAD

Type	Hours	Percentage
Self study	144,0	72.00
Hours small group	7,2	3.60
Hours medium group	40,8	20.40
Guided activities	8,0	4.00

Total learning time: 200 h

CONTENTS

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Description:

- Teaching models in the area of technology
- The attention to inclusion and universal learning design
- Analysis of objects
- The expert method
- Problem-based learning
- The project method
- Project-based learning
- Cooperative work
- The inverse class (Flipped classroom)
- The case method
- Just in time teaching
- Team based learning
- Dilemma based learning
- HBL, SBL, DBL, RBL, DgBL
- Design of practices
- Macroprogramming
- The training objectives
- Organization of virtual visits
- Advanced and classic assessment techniques

Specific objectives:

Know and apply innovative teaching methodologies
Design theoretical and practical learning sessions
Design and evaluate objective tests
Schedule complete courses

Related activities:

Activities: See activity plan.

Full-or-part-time: 31h

Theory classes: 31h

(ENG) L'avaluació

Description:

- (ENG) - Avaluació de l'aprenentatge a l'àrea de tecnologia.
- L'avaluació: un instrument per a la regulació.
 - Instruments per a l'avaluació.
 - L'autoavaluació i l'avaluació compartida.
 - Avaluació i qualificació.
 - Els criteris d'avaluació.
 - Avaluació dels processos d'ensenyament.
 - Psicometric Indicators in objective tests.

Related activities:

Activity 2: See activity plan.

Full-or-part-time: 3h 30m

Theory classes: 3h 30m



CIT resources for data analysis

Description:

- Use of spreadsheets.
- Elements for quantitative data analysis.
- Elements for qualitative data analysis.
- Statistical use for decision making.

Related activities:

See plan activities.

Full-or-part-time: 7h

Theory classes: 7h

Didactic resources

Description:

- Analysis of textbooks.
- Teaching and learning activities.
- Preparation of curricular visits.
- Teaching resources: computer, multimedia, bibliography and the environment.
- Simulators.

Specific objectives:

At the end of the subject, students must have the capacity to:

- Analyze textbooks.
- Design teaching and learning activities.
- Prepare curricular visits.
- Apply different didactic resources: computer, multimedia, bibliography and the environment.
- Explain in a basic way, applications that can be deduced from the use of simulators.

Related activities:

See activity plan

Full-or-part-time: 6h 30m

Theory classes: 6h 30m



ACTIVITIES

CLASSROOM DESIGN ACTIVITIES

Description:

Description, planning and assessment of an activity for the classroom based on the application of any of the methodologies seen in the classroom, applied to a specific level and topic. Individual or team work.

Specific objectives:

At the end of this activity, the students should be able to:

- Define an activity in the technology classroom based on one of the methodologies seen in the classroom.
- Establish the corresponding organizational criteria.
- Design the guidelines for observation and monitoring of students' work.
- Set evaluation criteria for students both in groups and individually.

Material:

Notes, bibliography, websites, course materials.

Delivery:

Delivery of the designed activity report: description, objectives, assessment criteria, attention to inclusion, organization.

Full-or-part-time: 4h

Self study: 4h

INDIVIDUAL EXERCISES

Description:

Various exercises related to:

- Instruments and evaluation criteria.
- Planning of multidisciplinary projects.
- Teaching and learning methodologies.

Specific objectives:

Upon completion of this activity, the students will be able to:

- Design different assessment instruments.
- Define evaluation criteria applicable to all students taking into account attention to diversity.
- Be able to apply different evaluation techniques related to the type of activity.
- Design multidisciplinary projects.

Material:

Notes, bibliography, webs, course material.

Delivery:

Delivery of exercises.

Full-or-part-time: 55h

Self study: 55h



ANALYSIS OF DIFFERENT TEACHING AND METHODOLOGY RESOURCES, AND ACTIVITY DESIGN

Description:

Analysis of different didactic resources and design of activities that use these resources in a globalized way. Teamwork.

Specific objectives:

At the end of this activity, the students should be able to:

- Know different types of teaching resources.
- Design activities that use multiple didactic resources.
- Use different free access simulators.
- Conduct virtual visits to museums.
- Teamwork.

Material:

Notes, bibliography, webs, course material.

Delivery:

Delivery of designed activities.

Full-or-part-time: 53h

Self study: 53h

ELABORATION OF A COURSE MACROPROGRAM

Description:

Preparation of the general programming of a technology course.

Specific objectives:

At the end of this activity, the students should be able to:

- Design the programming of a course, specifying the general programming of the teaching units.
- Relate within the programming all the contents worked on in the subject.
- Adjust the programming to the characteristics of a center and a typology of students.
- Consider attention to diversity with universal learning designs and alternative plans in case of failure of the original plan.

Material:

Notes, bibliography, webs, subject material.

Delivery:

Macroprogramming of a complete course.

Full-or-part-time: 40h

Guided activities: 8h

Self study: 32h

GRADING SYSTEM

The evaluation takes into account: the programming of an entire course in a team, 30%; the weekly deliveries of work proposals, 30%, as long as at least 80% of those proposed have been completed; the design of a team practice, 10%; an individual exam, another 10%; the preparation of teaching resources for a specific subject, another 10% and participation in classroom activities 10% (as long as participation is $\geq 80\%$).

Self-assessment and peer assessment will be encouraged; the assessment in any case will be formative through feedback so that the student's effort, which must be continuous throughout the course, has rapid feedback that allows mistakes to be corrected and learning to be guided.

EXAMINATION RULES.

The presential class expositive phases will be combined with team work and individual work activities and there will also be individual and team work in the non-presential part.

A large part of the work proposals will include the following activities:

- Navigation and search of information in the network.
- Reading of articles, books and official documentation.
- Exchange of information and ideas among students.

BIBLIOGRAPHY

Basic:

- Del Carmen, L.M. La planificació de cicle i curs. Barcelona: Graó, 1993. ISBN 8478270868.
- Baigorri, J. (coord.). Enseñar y aprender tecnología en la educación secundaria. Barcelona: ICE : Horsori, 1997. ISBN 8485840623.
- Jorba, J.; Casellas, E. Estratègies i tècniques per a la gestió social de l'aula: vol.1: La regulació i l'autoregulació dels aprenentatges. Barcelona: ICE UAB, 1996. ISBN 9788489489196.
- Sanmartí, N. 10 ideas clave: evaluar para aprender. Barcelona: Graó, 2007. ISBN 9788478274734.
- Zabala, A. La práctica educativa: cómo enseñar. Barcelona: Graó, 1995. ISBN 8478271252.
- María Luz Cacheiro González, Cristina Sánchez Romero, Jesús González Lorenzo, coordinadores. Recursos tecnológicos en contextos educativos [on line]. UNED, 2016 [Consultation: 11/05/2022]. Available on: <https://lectura-unebook-es.recursos.biblioteca.upc.edu/viewer/9788436270853>. ISBN 9788436270853.

Complementary:

- Cervera, David ; Blanco, Roberto [i 7 més]. Tecnología : investigación, innovación y buenas prácticas [on line]. Barcelona: Ministerio de Educación, 2010 [Consultation: 21/01/2022]. Available on: <https://lectura.unebook.es/viewer/9788436950069>. ISBN 9788436950069.
- Domínguez Fernández, Guillermo; Caraballo Román, Charo. La Dimensión social de la educación: ciudadanía crítica inclusiva, compromiso y empoderamiento de la cibersociedad, en el marco de la Agenda 2030. Barcelona: Graó, 2021. ISBN 9788418627002.
- Trujillo Saez, Fernando. Aprendizaje basado en proyectos: infantil, primaria y secundaria [on line]. 2015 [Consultation: 13/04/2022]. Available on: <https://lectura.unebook.es/viewer/9788436956450>. ISBN 9788436956450.
- Cervera, David [et al.]. Didáctica de la tecnología [on line]. Barcelona: Ministerio de Educación, 2010 [Consultation: 27/04/2022]. Available on: <https://lectura-unebook-es.recursos.biblioteca.upc.edu/viewer/9788436949988>. ISBN 9788436949988.
- Núria Alart, Joan Rúaix. Recursos TIC per a la tutoria en l'educació secundària: una visió pràctica a partir de la multiplicitat d'intel·ligències dels alumnes. UOC, 2008. ISBN 9788497887793.

RESOURCES

Audiovisual material:

- Apunts de l'assignatura. Resource

Hyperlink:

- Aula de Recursos de Tecnologia. Cesire Aulatec. Departament d'Educació. *
- Escola Oberta. Tecnologies. Xarxa Telemàtica Educativa de Catalunya. *
- Edu365.cat. Departament d'Educació. *
- Ordre ENS/108/2018, de 4 de juliol, per la qual es determinen el procediment, els documents i els requisits formals del procés d'avaluació a l'educació secundària obligatòria (DOGC núm. 7659, de 9.7.2018). <http://ensenyament.gencat.cat/ca/departament/normativa/disposicions-normatives/finalitzades/2018/ordres/orequisitseo/>- Comisión Europea: Las competencias clave. Comisión Europea.. [http://www.europarl.europa.eu/meetdocs/2004_2009/documents/com/com_com\(2005\)0548_/com_com\(2005\)0548_es.pdf](http://www.europarl.europa.eu/meetdocs/2004_2009/documents/com/com_com(2005)0548_/com_com(2005)0548_es.pdf)- Currículum i organització. Direcció general de l'educació bàsica i batxillerat. Departament d'Educació: http://xtec.gencat.cat/web/.content/alfresco/d/d/workspace/SpacesStore/0081/c2c17d15-7c0a-492e-9f21-9f024ae4e141/desplegam_ent_c_eso.pdf- Recursos didàctics. Institut de Ciències de l'Educació. Universitat Politècnica de Catalunya. <https://www.ice.upc.edu/ca/professorat-no-universitari/recursos-didactics>- Competències bàsiques de l'àmbit científicotecnològic. <https://educacio.gencat.cat/web/.content/home/departament/publicacions/colleccions/competencies-basiques/eso/ambit-cientificotecnologic.pdf>- Materials i recursos per a la formació. <https://ateneu.xtec.cat/>- Competència digital docent. <https://projectes.xtec.cat/xtcd/competencia-digital-docent/>- STEAMcat. <https://projectes.xtec.cat/steamcat/>