MEBS15 Didáctica de las Ciencias Naturales, Física y Química
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Subject: Didactics in Science
Type: Elective
Language: English
Modality: Blended
Credits: 6
Course: 2016-2017
Semester: 2nd
Professor: Manuel Blázquez Merino

1. PREVIOUS REQUIREMENTS

Demonstrate sufficient performance at level B2+ in English

2. BRIEF DESCRIPTION OF CONTENTS

This course presents the set of knowledge, strategies and methodologies to permit the student to be able to teach the Sciences Area subjects in a bilingual environment. Some aspects will be developed in order to know the contents of the subject, and the resources used in the area, such as materials and different spaces to work.

A special attention to ICT tools to implement in Science subjects will be shown in in-campus sessions in order to update the role of Science teacher in the scope of the 21st century.

3. STUDENTS COMPETENCES AND LEARNING OUTCOMES

MECES Competences

Know how to apply the acquired knowledge and the problem solving ability in new or unfamiliar contexts within wider (or multidisciplinary) contexts in relation with the study area.

Be able to integrate knowledge and to deal with the difficulty to make judgments with information that, being incomplete or limited includes reflections about social and ethical responsibilities linked to the application of knowledge and judgments.
Know how to communicate knowledge to specialist and non-specialist audience in a clear and unambiguous way.
Develop learning skills that will allow further study in a self-directed and autonomous way.

**General competences**

Know how to apply theories, linguistic models and teaching methodologies of a foreign language in the classroom.
Be familiar with the specific issues of foreign language teaching, as linguistic as cultural, in a bilingual education environment.
Apply the acquired knowledge in terms of making appropriate decisions in relation with the various factors involved in the foreign language learning and teaching process.
Develop the ability to perform critical analysis, evaluation and synthesis of new and complex ideas that allow autonomy when training and continuous updating of knowledge in the field of foreign language teaching.
Be able to transmit social and cultural values according to the multilingual and multicultural present.
Be acquainted with how to communicate with academic community colleagues and society in general about the areas of expertise.
Acquire basic theoretical knowledge to be able to develop an informed teaching practice.
Be familiar with laws and regulations concerning the management and organization of bilingual institutions.

**Specific competences**

Design integrated curricula within the area of Natural Sciences, Biology and Geology, and Physics and Chemistry with linguistic content in order to develop English / Spanish bilingual programs.
Create and adapt didactic materials for English / Spanish bilingual teaching, adjusting the linguistic level and with sensitivity to the different learning rates, adapting the original material in order to be turned into didactic material.
Understand the planning and evaluation tools needed in the teaching / learning process of English / Spanish languages.
Develop and implement didactic methodologies adapted to the diversity of students in an English / Spanish bilingual scope.
Assess both linguistic and cultural contents in English / Spanish bilingual teaching.
Incorporate new strategies, didactic materials and ICT into the activities in the bilingual English / Spanish classroom.
Design and develop learning spaces in the English / Spanish bilingual classroom, based on equity, education in a peace and democracy culture values, equal rights and opportunities between men and women, civic education and human rights respect.
Be able to use specialized terminology in English and Spanish in Sciences.
Be able to evaluate, select and use appropriate literary texts for the development of linguistic competence and the approach to technical and socio-cultural context of the foreign language (English / Spanish)
Be able to communicate fluently at CEFR C1 level.
Be able to apply different communication skills teaching strategies (interaction and production and oral and writing comprehension) according to foreign language learners.
Know the different variables in teaching / learning process of foreign languages from the perspective of the student and the communication needs of those, the process itself, of its continuous assessment and certification.
Know how to apply the advantages of the communicative approach and based-on-tasks learning of English and Spanish language interaction.
Know the teaching / learning methodology based on content and language integrated learning (CLIL) and know how to design and develop learning activities based on this methodology.
Know curricula elements, methodology and objectives in the area of Sciences.
Be able to use the most appropriate didactic techniques in the area of Sciences.

**Learning outcomes:**
Upon successful completion of this subject the student will:

- Know how to apply the acquired knowledge and the problem solving ability in new contexts within the Technology area by means of English teaching/learning process.
- Be able to develop reasoned ways to communicate on issues related to Sciences.
- Be able to acquire new knowledge autonomously in the field of sciences studies using the bilingual teaching / learning process.
- Be capable to transmit social and cultural values according to the European multilingual and multicultural reality.
- Be able to develop an informed teaching practice according to the acquired knowledge.
- Know the laws and regulations regarding the management and organization of bilingual institutions.
- Be able to create and adapt integrated curricula in the area of teaching / learning in Sciences and its different subjects involved.
- Be able to create and adapt materials for bilingual education taking into account the different levels of proficiency and different learning rates.
- Know how to develop and apply methodologies adapted to the diversity of students in a bilingual environment with scientific background.
- Be able to incorporate new strategies, materials and technologies to CLIL classroom activities.
• Know how to apply the advantages of the communicative approach and based-on-tasks learning for English and Spanish language interaction.
• Know the various scientific area elements of the curriculum, methodology and objectives in a bilingual environment.

4. ACTIVITIES AND METHODOLOGY
The teaching methodology combines face-to-face and online teaching, so it will be a mixed methodology (blended learning), which relies on the use of ICT (Blackboard platform) to support collaborative work (forums, chat, videoconference meeting) the guidance of Professor (calendar, bulletin board, folder, links) and the delivery of tasks. Previous reading of the texts proposed for discussion and further consideration will allow students to seek information through the resources available and be able to judge it critically for use in further learning and research processes.

The training actions of this Master are specified as follows:
• Teaching sessions
  ○ In-campus teaching sessions
  ○ Online teaching sessions
• Learning activities, individual and in groups outside the classroom sessions
• Tutorials
• Additional training activities

5. ASSESSMENT SYSTEM
Assessment tools:
1. Attendance and participation in working groups, discussions and workshops.
2. Group and individual activities.
3. Development and delivery of presentation in the area of Science.

Evaluation Criteria:
• Ability for teamwork and problem solving.
• Ability to search information through various sources and resources, to judge it critically and use it appropriately for teaching or research purposes.
• Ability to relate the content to teaching practice and other areas of knowledge.
Active participation in class discussions.
Ability to argue, defend with relevant data and contrast items proposed.
Use of typographical, structural and presentation conventions as well as capacity for reflection, analysis and drawing conclusions.

Ordinary:
Directed Activities (practice, tutorials, exercises & on-line activities, oral & written assignments, etc.) .............................................................. 25%
  • Case Study analysis
  • Practical exercises
  • Development of definitions and concepts
  • Computer exercises and use of software applications

Participation: online and in-campus classes & other learning activities...  15%

Design of a Science Subject Didactic Unit..............................................................60%

Please note that your final mark is the result of the average of your marks providing you have completed compulsory assignments and exam. Students are expected to have all lessons and set tasks prepared on the dates indicated. Late work will not be accepted and will not receive a mark. Plagiarism (illegal and unauthorised copying) is penalised with a zero grade (0) for the entire course.

Extraordinary:

Repeat design of the didactic unit.............................................................. 60%
The grades obtained in on-line exercises & activities, written assignments and oral presentation are kept .............................................................. 40%

Restraints:
In order to make up the final average grade, the student is required to attend a 80% of the sessions specified in the syllabus. Also, it is necessary to obtain a pass (5) in the final exam (either in the regular or repeat evaluation). Any grade in any activity under 5 is considered a fail.
6. BIBLIOGRAPHY

KEY REFERENCES

- Current Royal Decrees from Spanish ministry of Education, especially, Royal Decree 1105/2014 of Decemebre 26th
- "Teacher page. A resource for teachers". New York City Education Department. Available at: http://schools.nyc.gov/Teachers

COMPLEMENTARY REFERENCES

- Vila, Ignasi. (1983) "Reflexiones en torno al bilingüismo y la enseñanza bilingüe". Infancia y Aprendizaje 21 – pags. 4-22

WEB REFERENCES

- Physics and Chemistry Resources for ESO students - http://recursostic.educacion.es/apls/informacion_didactica/1419
7. PROFESSOR’S BRIEF CURRICULUM

Manuel Blázquez Merino is Industrial Engineer (UNED) in the area of Electronics and Automatic, and Industrial Technical Engineering in Electricity (ICAI – Universidad Pontificia de Comillas). Teacher in Secondary Education since 1996 in the area of Technology. Currently, Bilingual English Section teacher in Instituto de Educación Secundaria “Ramiro de Maeztu” in Madrid. Author of more than 20 Technology and ICT areas text books with different publishers (Anaya, Algaida, Bruño, Santillana).

He’s been training Technology teachers since 1998. Previously, since 1990, he has been working as an engineer in several industrial companies. Co-editor of contents in several Engineering Education Conferences EDUCON 2010 and TAEE 2010 in Engineering and Technology area and study guides for teachers. Co-author in "Encyclopedia del Estudiante“ published by El País for Students in Secondary Schools. Author of contents for Technology public teachers examinations. His interests are Engineering, Technology development, and Teacher Training.

8. PROFESSOR’S DEPARTMENT LOCATION AND OFFICE HOURS

When needed, teacher will be noticed of the interest of a student addressing an email or a written notice to: Manuel Blázquez Merino - mblazque@nebrija.es

Note: It is always advisable to make an appointment with the lecturer beforehand in order to ensure he is available
9. DETAILED COURSE CONTENTS

Master’s Course in Bilingual Education
Didactics in Science
YEAR: 2016-2017  SEMESTER: 2nd  ECTS credits: 6

ONLINE SESSIONS:

<table>
<thead>
<tr>
<th>Week</th>
<th>Session</th>
<th>Description of session</th>
<th>Student’s individual tasks and practical Works</th>
<th>In-campus hours</th>
<th>Hours/week recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Didactical basis of CLIL Science: Key concepts and major issues.</td>
<td>Activities Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Biology and Geology in 1st cycle</td>
<td>Activities Reflections on case studies Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Physics and Chemistry in 1st cycle</td>
<td>Activities Reflections on case studies Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Science Subjects in 2nd Cycle</td>
<td>Activities Reflections on case studies Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Design and development of specific didactic units.</td>
<td>Activities Reflections on case studies Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>ICT tools to enhance Science teaching and learning process.</td>
<td>Activities Reflections on case studies Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Assessment of Science subjects: functions, criteria and procedures</td>
<td>Activities Reflections on case studies Practical assignments</td>
<td>2h</td>
<td>13h</td>
</tr>
</tbody>
</table>

TOTAL = 105 hours
### IN-CAMPUS SESSIONS:

<table>
<thead>
<tr>
<th>Week</th>
<th>Session</th>
<th>Description of session</th>
<th>Student’s individual tasks and practical Works</th>
<th>In-campus hours</th>
<th>Hours/week recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Didactical basis of CLIL Science: Key concepts and major issues.</td>
<td>Text analysis &amp; discussion - Concept clarification- Practical Examples</td>
<td>1h15m</td>
<td>10 h</td>
</tr>
</tbody>
</table>
| 1    | 1       | Biology and Geology in 1st cycle | Text analysis & discussion  
Concept clarification  
Practical Examples  
Review of past activities  
Assignment assessment and guidance |                   |                       |
| 2    | 2       | Physics and Chemistry in 1st cycle | Text analysis & discussion  
Concept clarification  
Practical Examples  
Review of past activities  
Assignment assessment and guidance | 1h15m           | 10 h                   |
| 2    | 2       | Science Subjects in 2nd Cycle | Text analysis & discussion  
Concept clarification  
Practical Examples  
Review of past activities  
Assignment assessment and guidance |                   |                       |
| 3    | 3       | Design and development of specific didactic units. | Text analysis & discussion  
Concept clarification  
Practical Examples  
Review of past activities  
Assignment assessment and guidance | 1h15m           | 10 h                   |
| 4    | 4       | ICT tools to enhance Science teaching and learning process. | Text analysis & discussion  
Concept clarification  
Practical Examples  
Review of past activities  
Assignment assessment and guidance | 1h15m           | 10 h                   |
| 4    | 4       | Assessment of Science subjects: functions, criteria and procedures | Text analysis & discussion  
Concept clarification  
Practical Examples  
Review of past activities  
Assignment assessment and guidance |                   |                       |
|      |         |                         | **TOTAL** | **= 45 hours** |