

**COURSE DATA****Data Subject**

Code	35075
Name	Criminal Analysis Techniques
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1302 - Degree in Criminology	Faculty of Law	2	Second term
1923 - D.D. in Law-Criminology	Faculty of Law	2	Second term

Subject-matter

Degree	Subject-matter	Character
1302 - Degree in Criminology	15 - Forensic techniques	Obligatory
1923 - D.D. in Law-Criminology	3 - Year 2 compulsory subjects	Obligatory

Coordination

Name	Department
HERRERO SENDRA, SALVADOR	194 - Genetics
PEREZ GIMENEZ, FACUNDO	315 - Physical Chemistry

SUMMARY

The advance of the techniques in physic-chemistry, genetics, biochemistry and molecular biology in the last 60 years have allowed the application and adaptation to the peculiarities presented by the samples collected at the crime scene. , This technology is put to use in laboratories where forensic scientists works to obtain relevant information from biological materials (hair, semen, saliva, blood ...) or chemical (drugs, explosives, poisons, drugs ...). The subject of "Techniques in criminal analysis" aims to bring professional in criminology at the laboratory where these tests are performed. With this subject we aim that students learn about the scientific language employed in criminal analysis and also about the scientific basis of the different techniques used in the laboratory. Additionally we want student to know the applications that this techniques have in criminology.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1302 - Degree in Criminology

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LEARNING OUTCOMES

The course is designed so students, as a result of the learning, acquire the following competencies:

- Be able to discern about the appropriateness of applying or demanding certain forensic test.
- To properly know the concepts used in forensic laboratories and reports.
- Be able to cooperate with different expert in forensic analysis in the field of chemical, toxicological and molecular biology.
- To learn the methodology and instrumental techniques used in forensic laboratories.

DESCRIPTION OF CONTENTS

1. The DNA, the molecule that carries the genetic material

Definition of gene

Biochemical and Structural Properties of DNA

Genes are located on chromosomes

What gives us DNA? Daubert standard

2. Flow of genetic information

DNA Replication

Central Dogma of molecular biology (one gene, one protein)

Transcription and Translation

Variability in proteins

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3. Sources of DNA in forensic applications. Collection and processing of biological samples

Where do we find DNA?

Main sources of DNA in forensic applications

Different types of DNA in forensic applications

Biological samples. Collection and processing

DNA manipulation in the laboratory

4. Basic laws of inheritance

One gene, one locus, multiple alleles

Basic laws of inheritance: Mendel and his peas

Calculating the probability of transmitting a character

Interpretation of a pedigree

Basic patterns of inheritance

Prediction of physical and psychic traits

5. Genetic variability in populations

Where to find genetic variability

Types of DNA markers

Inheritance of genetic markers

mitochondrial DNA

DNA markers and probabilistic analysis.

6. Techniques for the detection and analysis of nucleic acids and proteins

Polymerase chain reaction (PCR)

Genetic fingerprinting by PCR

Immunological techniques for the detection of proteins and other substances.

Protein Electrophoresis

7. Physical and electrochemical techniques

Physical techniques: mass and volume measurements. Forensic light sources. Microscopies. Detection of radioactive elements. Electrochemical techniques: measurement of pH and conductivity.

8. Identification of toxic chemicals

Atomic spectroscopy techniques: Emission, Atomic Absorption and Fluorescence, for the identification and

quantification of toxic chemical elements

**9. Identification of narcotic drugs and toxic substances (I)**

Molecular spectroscopy techniques: Ultraviolet-Visible Absorption, Fluorescence Emission, Infrared Absorption and Raman Dispersion, for the identification and quantification of narcotic drugs and toxic substances.

10. Identification of narcotic drugs and toxic substances (II)

Separation techniques: Electrophoresis, Chromatography, Ionic Mobility Spectrometry and Mass Spectrometry, for identification and quantification of narcotic drugs and toxic substances.

11. Instrumental Techniques Laboratory**12. The Molecular Genetics Laboratory I: Introduction****13. The Laboratory of Molecular Genetics I: biochemical and genetic markers for people identification****WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	40,00	100
Laboratory practices	20,00	100
Development of group work	10,00	0
Study and independent work	30,00	0
Preparing lectures	40,00	0
Preparation of practical classes and problem	10,00	0
TOTAL	150,00	

TEACHING METHODOLOGY

The development of the course is structured in weekly session of 2 hours and 30 min and 5 laboratory sessions that will be spread throughout the course.

During the weekly sessions in the classroom the most important aspects of each topic will be reviewed. In these sessions students will be encouraged to actively participate through the inclusion during the sessions of short questions related to the topic.



In the laboratory sessions the students will get in contact with the methodology used in forensic laboratories while also consolidating the knowledge acquired in the theoretical sessions.

Finally, the individual study will be used to consolidate the knowledge acquired and will be evaluated through a written test.

Optionally (if the schedule allows it) students will attend conferences and seminars on issues related to the subject.

EVALUATION

Learning assessment will be determined evaluating different aspects. To do this, the final mark of the subject is calculated based on the marks obtained in the following parts:

Part A: 70% of the final score will correspond to a written test to be held at the end of the course.

Part B: 30% of the final score will correspond to the assessment of laboratory practices. This block will be assessed considering the attendance at laboratory sessions and attitude of the student during the same (50% of the block). The knowledge acquired will be assessed (50% of the block) with the presentation of a report to discuss the results obtained during the practical sessions.

It should be noted that attendance at laboratory sessions is essential to pass the course.

Additionally, in the last period of the course the students may voluntarily prepare a paper on topics related to the subject proposed by the teachers in charge. This work could provide up to 1 additional point to the final score.

To pass the course, a score higher than five out of them will be needed and a minimum score of 5/10 in A. Students who fail the course in the first round of the course, will keep the note of part B for the second round. Students who are not assessed in any of the parts A and B, appear as NO PRESENTED in the official marks.

REFERENCES

Basic

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- Valls, O y Del Castillo, B (1998). Técnicas instrumentales en Farmacia y Ciencias de la Salud Ediciones Piro. Barcelona. ISBN: 84-853-2515-X
- Matthewu E. Jholl (2009). Química e investigación criminal. Una perspectiva de la ciencia forense. Editorial Reverté. Barcelona. ISBN: 978-84-291-5512-9.



- Siegel, Jay A., Mirakovits, Kathy (2010). Forensic Science: the basics (second edition). CRC Press. Taylor and Francis Group. ISBN 978-1-4200-8902-8.
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- Baynes, JW y Dominizack, MH (2006). Bioquímica Médica. 2ª ed. Ed. Elsevier ISBN:84-8174-866-8

Additional

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- Griffiths, AJF, Gelbart, WM, Miller, JH, y Lewontin, RC (2000). Genética moderna. McGraw-Hill-Interamericana. ISBN: 84-486-0279-X
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- Antón, F y De Luis, JV (1990). Policía científica. Vol. I y II. 3ª Edición. Editorial Tirant Lo Blanch. Valencia ISBN: 84-370-0642-2
- Herrero S, Ivorra JL, García-Sogo M, Martínez-Cortina, C. 2008. Biochemistry and molecular biology techniques for person characterization. BAMBED 18; 347-353
- International Society for Forensic Genetics: www.isfg.org
- DNAi.org (DNA interactive): <http://www.dnai.org/index.htm>
- Klaasen, W. Fundamentos de toxicología (2005). Mc Graw-Hill ISBN: 978-844-860-5346

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1. Contenidos



Al inicio del estado de emergencia la mitad de los contenidos de la asignatura se encontraba ya completado de las sesiones presenciales, a excepción de algunas sesiones de laboratorio. El contenido pendiente se mantiene tal y como estaba previsto.

Respecto a las sesiones de laboratorio se mantienen los contenidos teóricos y se trabajará con materiales en el aula virtual para que puedan adquirir los mismos contenidos que los grupos ya concluidos.

2. Volumen de trabajo y planificación temporal de la docencia

Se mantiene el peso de las distintas actividades que suman las horas de dedicación en créditos ECTS marcadas en la guía docente original.

Respecto a las sesiones de teoría se está procediendo a aportar los materiales pertinentes en el mismo orden y temporalización que aparece en la guía docente o en los horarios previstos para la asignatura. La organización original suponía el estudio de un tema del programa en cada sesión de 2,5 horas y se mantiene de la misma forma.

Respecto de los laboratorios, dado que algunos grupos no pudieron iniciarse y otros correspondían a fechas dentro del estado de alarma, se va a retrasar el aporte de material

para que puedan trabajar con información adaptada a la situación.

3. Metodología docente

En la parte de teoría, se han subido las presentaciones de cada lección, con la misma temporalización, pero acompañados de anexos explicativos. Para facilitar la comprensión de los temas se hace especial hincapié en aquellos aspectos más relevantes aportando información extra que no haga necesaria la consulta de fuentes externas.

Se ofrece a los alumnos la consulta a través del aula virtual de todos aquellos aspectos en los que les puedan quedar dudas. En función de la interacción con el alumnado se planteará alguna actividad de realización de test para la comprobación del grado de asimilación de los conceptos de cada tema.

Para la parte de laboratorio se va a proceder a subir las presentaciones autoexplicativas que permitan a los alumnos comprender paso a paso lo que hubieran hecho en el laboratorio. Además, se les va a proporcionar un conjunto de resultados (basados en los de otros años y/o grupos para que puedan completar la tarea de laboratorio. La tarea de laboratorio es idéntica a la que realizan los grupos ya completados, pero se han añadido algunas preguntas muy cortas para evaluar la comprensión de las presentaciones utilizados.



Respecto a los casos prácticos y problemas, se ha subido un conjunto de problemas sin resolver y posteriormente se ha añadido al aula virtual el enlace a las presentaciones autoexplicativos con la resolución de todos los problemas.

4. Evaluación

Dado que el examen de la asignatura es tipo test, la única adaptación que se hará será la de realizarlo en modo virtual, en principio dentro de la plataforma del aula virtual de la UV, pero siempre siguiendo las recomendaciones que recibamos de Rectorado y que nos permita la realización de una prueba en condiciones fiables.

El requisito de la nota mínima en la prueba escrita se ha reducido de una nota igual o superior a 5 a una nota igual o superior a 4.

5. Bibliografía

No se hace necesario aportar nueva bibliografía. La planteada es accesible y en las presentaciones de las sesiones no realizadas se ha añadido información suficiente para la comprensión de la materia.