



**UNIVERSITA' DEGLI STUDI DELLA BASILICATA**  
**DIPARTIMENTO DI SCIENZE**

**Insegnamento ANALISI DEI FARMACI II**

**Corso di studio:** FARMACIA

**Anno di Corso:** III

**Periodo** II SEMESTRE  
**didattico:**

**Tipologia:** B

**Totale Crediti:** 12

**Tipo Esame:** SCRITTO/ORALE

**Valutazione:** VOTO FINALE IN TRENTESIMI

**Lingua di** Italiano, \_\_\_\_\_  
**insegnamento:**

inizio corso MARZO 2015 fine corso GIUGNO 2015

**APPELLI DI ESAME**

Mese	Anno	Appello previsto
Febbraio	2015	X
Marzo	2015	X
Aprile	2015	X
Maggio	2015	X
Giugno	2015	X
Luglio	2015	X
Settembre	2015	X
Ottobre	2015	
Novembre	2015	X
Dicembre	2015	
Gennaio	2016	X

**COMMISSIONE ESAME:**

Presidente: Marco CATTO

Componente: Innocenzo CASELLA

Componente: Michele MANFRA

**ORARIO RICEVIMENTO STUDENTI**

	dalle ore	alle ore	presso
LUNEDI'			
MARTEDI'			
MERCOLEDI'	11	13	
GIOVEDI'			
VENERDI'			





## **UNIVERSITA' DEGLI STUDI DELLA BASILICATA**

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Lezioni frontali, esercitazioni in aula e di laboratorio

#### **Modalità di verifica dell'apprendimento**

Esame finale scritto e orale

#### **Testi di Riferimento**

- O. Bruno, F. Savelli, *Analisi Chimico Farmaceutica*, Piccin-Nuova Libreria.
- Robert M. Silverstein, *Identificazione spettroscopica di composti organici*, Casa Ed. Ambrosiana.
- David G. Watson, *Analisi Farmaceutica*, EdiSES.
- Farmacopea Ufficiale Italiana, European Pharmacopeia (ultime edizioni).
- *Clarke's Analysis of Drugs and Poisons*, Pharmaceutical Press.
- R. M. Roberts, J. C. Gilbert, S. F. Martin, *Chimica Organica Sperimentale*, Zanichelli.
- Lampman G. M., *Il Laboratorio di Chimica Organica*, Sorbona.

Altre informazioni:

La frequenza del corso e delle relative esercitazioni è obbligatoria e verrà accertata tramite rilevamento delle presenze. Saranno ammessi all'esame solo gli studenti la cui presenza accertata non sia inferiore al 70% delle rilevazioni. Sono esentati dall'obbligo di frequenza gli studenti lavoratori o altrimenti impossibilitati, con comprovata motivazione.



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**COURSE DRUG ANALYSIS II**

**Course of studies:** PHARMACY

**Academic Year:** 2014/15

**ECTS:** 12

**Teaching Methods:** Lectures – Lab activities – e-learning

**Evaluation** Written and oral exam

**Methods:**

**Evaluation:** score on 30 points

**Semester:** II

**Language:** ITALIAN (and ...)

Course beginning on MARCH 2015 ending on JUNE 2015

**Calls for examination**

Month	Year	Expected call
February	2015	X
March	2015	X
April	2015	X
May	2015	X
June	2015	X
July	2015	X
September	2015	X
October	2015	
November	2015	X
December	2015	
January	2016	X

**Examination Panel:**

President: Marco CATTO

Member: Innocenzo CASELLA

Member: Michele MANFRA

**Previous requirements:**

A good knowledge of organic chemistry is preferable.

**Learning Outcomes:**

the course is expected to furnish the skills in planning and executing

- analyses of drugs from Italian and European Pharmacopeia
- analytical methodologies (IR, NMR, MS) for organic and organometallic analysis;
- stability and purity control of drugs;
- current methodologies for separation and purification of pharmaceutically relevant





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substances;  
e) detection of abuse substances.

#### **Syllabus:**

1. Bibliographic sources and databases: scientific literature, databases on medication, Italian and European Pharmacopoeia (monographs).
2. Physical constants: combustion tests, elemental composition, phase diagrams; equilibrium between phases, melting point.
3. Solubility: variation of energy in dissolution processes; physical and chemical nature of the solute-solvent interactions; applications; Henderson-Hasselbalch equation; partition (logP) and distribution (logD) coefficients; solubility profiles, sigmoidal curves.
4. Qualitative organic analysis. Physico-chemical properties and reactions of identification of aldehydes and ketones, alkaloids, benzoates and salicylates, barbiturates, citrates, lactates, tartrates, penicillins. Organometallic substances (stated in the syllabus).
5. Toxicological tests for drugs of abuse: rapid identification with colorimetric tests for opiates, cannabinoids, steroids, hallucinogens.
6. Elements of spectroscopy: Properties of electromagnetic radiation, electromagnetic spectrum, wave parameters, atomic transitions.
7. Infrared spectroscopy (IR): vibrational pattern, types of molecular vibrations (stretching, bending), harmonic and anharmonic vibrations, absorption bands. Reading and interpretation of infrared spectra of main chemical classes.
8. Nuclear magnetic resonance spectroscopy (NMR): quantum numbers (spin magnetic quantum number, the spin quantum number), states, Larmor frequency. Precession of the magnetic moment, relaxation mechanism. Fourier transform spectroscopy. Relationship between chemical shift and structure: inductive and mesomeric effects, shielding/unshielding effects, anisotropic properties of magnetic and chemical equivalence, examples of multiple signals, relative intensities, coupling constants, typical splitting patterns (first order and higher orders). Reading and interpretation of <sup>1</sup>H-NMR spectra. Models of homomeric, enantiomeric and diastereomeric mixtures.
9. Mass Spectrometry: ionization of molecules in the gas phase, mass / charge ratio, deflection of ions in a magnetic field. Molecular ion: rule of the nitrogen atoms, chlorinated and brominated compounds. Methods for determination of the molecular ion. Fragmentation of the molecular ion: alpha cleavage, transposition of McLafferty. Analysis of mass spectra representative of various classes of compounds.
10. Chromatography: a brief history, useful definitions for a chromatographic process, IUPAC nomenclature. Chromatographic properties of the stationary phase. Normal phase and reverse phase. Eluotropic strength in normal phase. Chromatographic plates, number of theoretical plates and corresponding mathematical derivation and graphics. Dispersion phenomena. Resolution and its mathematical derivation and graphics. Elements of some instrumental chromatographic techniques (GC, HPLC). Laboratory exercises for the following experiences: measure of solubility and melting point of organic substances, identification reactions of amines and amino acids; identification reactions of phenols; identification of unknown sample compounds listed in EP/IP; identification of unknown sample from EP; rapid identification of substances of abuse.

#### **Suggested textbooks**

- O. Bruno, F. Savelli, *Analisi Chimico Farmaceutica*, Piccin-Nuova Libreria.
- Robert M. Silverstein, *Identificazione spettroscopica di composti organici*, Casa Ed. Ambrosiana.
- David G. Watson, *Analisi Farmaceutica*, EdiSES.
- *Farmacopea Ufficiale Italiana, European Pharmacopeia* (ultime edizioni).
- Clarke's *Analysis of Drugs and Poisons*, Pharmaceutical Press.
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**Further information:**





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