

Module Title: Vibrational Spectroscopy
Module Code: AM0908
Maximum Number of Students: Depends on lab space and facilities. Instrument demonstrations will make the upper limit < 12
Total ECTS Credits 2
Notional Learning Hours (a) Contact Time - 16h (b) Private Study - 24h
Format of Teaching: Lectures 12 h Laboratories or Practicals 4 h Other 0 h
Teaching Strategy: Formal lectures in 60/90 min timetable. Laboratory exercises
Convener: E.Nodland
University: University of Bergen
Language of Tuition: English
Module Description - The Purpose or Aims: <ol style="list-style-type: none"> 1. To introduce infrared spectroscopy 2. Introducing IR as a qualitative technique 3. Good laboratory practice
Learning Outcomes: At the end of the module the student is expected to be able to: <ol style="list-style-type: none"> 1. Perform qualitative IR spectroscopy of pure compounds selecting appropriate measurement techniques 2. Describe why molecules absorb infrared radiation 3. Explain different types of infrared spectrometers 4. Interpret spectra and use search libraries
Summary of Course Content: IR spectroscopy is a work horse in the analytical laboratory. This module will give knowledge of the theory and practice of how to obtain and recognise high quality spectra for compound identification, explorative analysis and multivariate classification. The module includes lectures in <ul style="list-style-type: none"> - Theory (vibrations, frequencies, selection rules, molecular interactions.) - instrumentation (instrumental components, spectrometers, sampling accessories) - sampling techniques - information enhancement (noise reduction, spectral subtraction, differentiation, library search) - spectrum interpretation of organic compounds
Transferable Skills Taught: The ability to use commercially available spectrometers and sampling accessories and choose appropriate sampling technique based on sample phase and state. Recognise the presence of common functional groups.

Assessment Methods:

Oral practical assessment (100%)

Assessment Criteria:Threshold

LO1 – Describe the principles of the analytical method based on the major components of the instrumentation used.

LO2 – Describe properties of electromagnetic radiation

LO3 – Describe absorption of radiation and molecular vibrations

LO4 – Interpretation of spectra of simple hydrocarbons

Good

LO1 – Describe different designs of IR spectrometers and instrumental components

LO2 – Understand the selection rules, group frequencies and vibrational modes

LO3 – Being able to perform simple IR measurements without guidance, and perform library search

LO4 – Understanding the concepts of signal enhancement such as subtraction, smoothing.

Excellent

LO1 – Understand the inherent advantages of FT spectroscopy

LO2 – Knowledge of more advanced sample preparation techniques and sampling of solids, liquids and gases.

LO3 – Independently selecting sampling and sample preparation techniques and correcting spectra for ambient signals.

LO4 – Understanding of vibrational coupling, Fermi resonance and temperature effects.

Resource Implications of Proposal and Proposed Solutions:

Günzler, Helmut and Gremlich, Hanz-Ulrich: IR spectroscopy : an introduction