

10466-752 (8) Physics of Radiotherapy (1½ ℓ, 1½ p)

2016

Course summary:

Dosimetry of teletherapy, filters, treatment planning, geometry of the beam, teletherapy units, quality assurance, electron therapy, brachytherapy, unsealed sources and beta irradiators.

Outcomes of course:

The objective of the course is to introduce the student to the basic principles of dose measurements and dose calculations for teletherapy and brachytherapy. The student should further obtain knowledge on beam shaping, shielding and treatment planning of the radiotherapy patient.

Lecturer:

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Mentor:

The Department of Physics has appointed a staff member as mentor for each year of its physics programme to be available to students for consultation. Students should feel free to discuss general issues related to the physics programme or specific modules in the programme with the relevant mentor, in addition to usual consultations with their individual lecturers of modules.

The mentor for the Honours programme and its modules is Prof HC Eggers eggers@physics.sun.ac.za

Course content:

1. **Dosimetry of Teletherapy**
Phantom materials; Dose parameters: backscattering factor, percentage depth dose, tissue-air-ratio, tissue-phantom-ratio, isodose curves; Dose measuring.
2. **Filters**
Beam hardening; Shielding; Beam flatness; Compensation; Wedges.
3. **Treatment planning**
Localisation; Multiple beams; Correction techniques.

4. **Geometry of the Beam**
Beam shaping; Penumbra.
5. **Teletherapy units**
Therapeutic x-ray units; Cobalt unit; Medical linear accelerator; Patient set-up.
6. **Quality assurance**
Acceptance of equipment; Calibration of a teletherapy unit; Quality control programme.
7. **Electron therapy**
Energy of electron beams; Characteristics of electron beams; Dose distributions; Dose measurement.
8. **Brachytherapy**
Techniques; Dosimetry; Radiographic techniques; Paris system; Radiation protection.
9. **Unsealed sources and Beta irradiators**
Radionuclides; Dosimetry; Radiation protection; Surface therapy.

Practical (Tutorials):

Study material:

Study notes. The following text books are not prescribed, but will be used complementary to the study notes.

1. Faiz M Khan, *The Physics of Radiation Therapy*, Second Edition, Williams and Wilkens, 1994.
2. *Radiotherapy Physics in practice*, JR Williams and DI Thwaites, Oxford Medical Publications, 1994.
3. HE Johns, JR Cunningham, *The Physics of Radiology*, Fourth Edition, Charles C Thomas Publisher, 1984.

Learning opportunities:

Assessment:

Methods of Assessments

The students will write a test during the course. At the end of the module a written examination (3 hours paper) will be taken down on the full contents of the specific module.

Venue and time of assessment opportunities

Set in consultation with the students.

Availability of marks:

Within a reasonable time

Calculation of class mark:

As determined by HPCSA requirements

Calculation of final mark for the module:

As determined by HPCSA requirements

Admission to examination:

As determined by HPCSA requirements