

# Advanced Master's Degree Comprehensive Medical Oncology





## Advanced Master's Degree Comprehensive Medical Oncology

- » Modality: online
- » Duration: 2 years
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtitute.com/us/medicine/advanced-master-degree/advanced-master-degree-comprehensive-medical-oncology](http://www.techtitute.com/us/medicine/advanced-master-degree/advanced-master-degree-comprehensive-medical-oncology)

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# 01

# Introduction

Comprehensive Medical Oncology is a medical specialty in constant evolution due to scientific advances, clinical challenges and the growing demand for comprehensive and multidisciplinary care in cancer management. For medical professionals and specialists dedicated to this area, it is crucial to keep up to date with the latest developments and treatment approaches. This is where the present program plays a fundamental role, delving into the most important novelties in the area. Thus, the specialist will delve into the latest treatments and diagnostic methodology around cancer, all in a 100% online format that allows you to combine it with your responsibilities



SIGNA  
PET/MR



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*Update yourself with the latest advances in Comprehensive Medical Oncology and expand your knowledge in cancer molecular biology, cutting-edge therapies and precision medicine”*

The field of Comprehensive Medical Oncology is a constantly evolving specialty due to scientific advances, clinical challenges and the growing demand for comprehensive and multidisciplinary care in cancer management. Medical professionals and specialists dedicated to this specialty face a series of specific novelties and challenges that require constant updating.

Given this context, TECH has created the Advanced Master's Degree in Comprehensive Medical Oncology, which offers an advanced and comprehensive update for those physicians and specialists interested in staying current in this constantly evolving specialty. This program provides a wide range of knowledge and skills necessary to address current clinical and scientific challenges in the field of Comprehensive Medical Oncology

The rationale for participating in this program lies in the need to stay current in the constantly evolving field of Comprehensive Medical Oncology. Advances in the molecular understanding of cancer, the development of new therapies and treatment approaches, as well as the growing importance of comprehensive and multidisciplinary care in cancer management make it essential to have an updated and complete instruction in this specialty.

The Advanced Master's Degree in Comprehensive Medical Oncology offers a wide range of topics, including the molecular biology of cancer, advances in diagnosis and treatment, genomic data mining techniques, psycho-oncological care, radiotherapy and psychological treatments in cancer and third generation therapies. Participants will have the opportunity to update their knowledge and gain a comprehensive, multidisciplinary perspective on cancer management.

An outstanding advantage of this program is that it is taught 100% online, which allows participants to access the Virtual Campus from anywhere and at any time, adapting to their schedules and professional responsibilities. In addition, the program uses innovative educational methodologies, such as clinical simulations and case discussions, which allow participants to practically apply the knowledge acquired and strengthen their clinical skills.

This **Advanced Master's Degree in Comprehensive Medical Oncology** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ♦ The development of case studies presented by experts in oncology
- ♦ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ♦ Practical exercises where self-assessment can be used to improve learning
- ♦ Its special emphasis on innovative methodologies in cancer management
- ♦ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ♦ Content that is accessible from any fixed or portable device with an Internet connection



*Delve into multidisciplinary approaches to comprehensive cancer management, addressing clinical, psycho-oncological and side effect management aspects”*

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*Delve into the latest techniques in the genomic era, use of Unix and Linux in bioinformatics, data analysis in Big Data projects with R for an updated and cutting-edge clinical practice”*

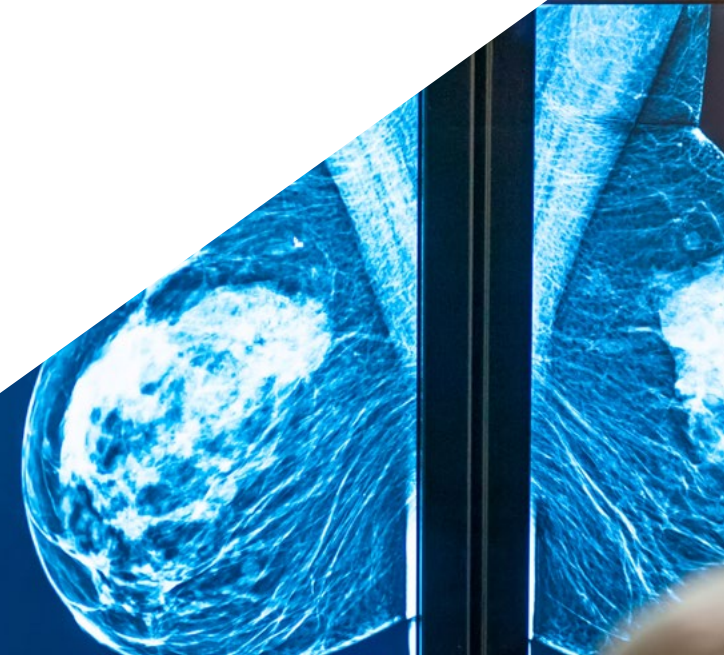
Includes in its teaching staff professionals belonging to the oncology field, who pour into this program the experience of their work, in addition to recognized specialists from reference societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersive learning experience designed to prepare for real-life situations.

This program is designed around Problem-Based Learning, whereby the student must try to solve the different professional practice situations that arise throughout the program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Expand your knowledge in specific cancers such as breast, lung, ENT, colorectal, gynecological, urological, sarcoma, melanoma and brain cancers.*

*Analyze assessment and measurement instruments in psycho-oncology, communication with the oncology patient and bereavement management.*



# 02 Objectives

The Advanced Master's Degree in Comprehensive Medical Oncology has as its main objectives to provide health professionals with an advanced update in the different aspects of medical oncology, to promote the acquisition of clinical and research skills in the integrated management of cancer and to foster a holistic and compassionate vision in oncological care.







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*Develop clinical and research skills in the integral management of cancer, with a holistic approach that seeks to contribute to the scientific advancement in the field of cancer”*



## General Objectives

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- ♦ Be able to accurately interpret the volume of clinical information currently available and associated with the biological data generated after a bioinformatic analysis
- ♦ Learn how to perform a good assessment of the cancer patient, starting with the epidemiology, diagnosis and staging of the most frequent tumors
- ♦ Delve into the complementary studies that help us in the diagnosis and decision making of the main neoplasms
- ♦ Become familiar with the main genetic syndromes that predispose to the development of this disease
- ♦ Recognize and manage the main breast, lung, digestive, urological, gynecological and mesenchymal tumors





## Specific Objectives

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### Module 1. Molecular Biology

- ♦ Update knowledge on the molecular biology of cancer, in relation to different concepts such as genetic heterogeneity or microenvironment reprogramming
- ♦ Provide and expand knowledge on immunotherapy as an example of a clear scientific advance in translational research
- ♦ Learn about a new approach to the classification of the most frequent tumors based on genomic data available in The Cancer Genome Atlas (TCGA) Research Network

### Module 2. Genomic or precision oncology

- ♦ Discuss the change in the current landscape with the introduction of genomic data into the biological understanding of tumors
- ♦ Explain how genomic classification provides independent information to predict clinical outcomes, and will give the biological basis for an era of personalized cancer treatment
- ♦ Learn the new genomic technologies currently used in DNA and RNA sequencing, based on the human genome sequence and made possible since the completion of the Human Genome Project, which has represented an unprecedented expansion of the capabilities of molecular genetics in genetic and clinical diagnostic research
- ♦ Discuss the bioinformatics process followed for the interpretation and application of biological data
- ♦ Analyze and interpret biological information at the molecular, cellular and genomic levels

### Module 3. Changes in the Current Clinical Practice and New Applications with Genomic Oncology

- ♦ Discuss and know how to interpret tumor mutational burden (TMB) as a genomic biomarker that has a significant impact on the landscape of cancer immunotherapy
- ♦ Learn how liquid biopsy of circulating DNA allows us to understand specifically what kind of molecular changes are happening in the tumor in real time
- ♦ Describe the current paradigm for incorporating genomic data into current clinical practice

### Module 4. Use of Unix and Linux in Bioinformatics

- ♦ Learn about the Linux operating system, which is currently essential in the scientific world both for the interpretation of biological data from sequencing and it also should be for medical text mining when handling large-scale data
- ♦ Provide the basics of accessing a Linux server and how to find and install packages to install software locally
- ♦ Describe basic Linux commands for: creating, renaming, moving, and deleting directories; listing, reading, creating, editing, copying, and deleting files
- ♦ Understand how permissions work and how to decrypt the most cryptic Linux permissions easily

### Module 5. Data analysis in Big Data projects: R programming language

- ♦ Discuss how the adoption of next-generation sequencing (NGS) in a diagnostic context raises numerous questions regarding the identification and reporting of variants in secondary genes for patient pathology
- ♦ Get started in the R programming language, which has the advantages of being an open-source programming language and has multiple statistical analysis packages available
- ♦ Learn basic R programming concepts such as data types, vector arithmetic and indexing
- ♦ Performing operations in R, including sorting, creating or importing data

- ♦ Learn how problem solving begins with a modular decomposition and then further decompositions of each module in a process called successive refinement
- ♦ Learn the basics of statistical inference to understand and calculate p-values and confidence intervals while analyzing data with R
- ♦ Provide examples of R programming in a way that will help make the connection between concepts and their implementation

### Module 6. Graphical Environment in R

- ♦ Using visualization techniques to explore new datasets and determine the most appropriate approach
- ♦ Learn how to visualize data to extract information, better understand data and make more effective decisions
- ♦ Teach how to take data that at first glance has little meaning and visually present that data in a form that makes sense for analysis
- ♦ Learn how to use the three main graph sources in R: base, lattice and ggplot2
- ♦ Know what each graphics package is based on in order to define which one to use and the advantages offered by one or the other

### Module 7. Statistical analysis in R

- ♦ Describe the most appropriate statistical techniques as an alternative when data do not conform to the assumptions required by the standard approach
- ♦ Learn the basics of conducting reproducible research by using R scripts to analyze data

### Module 8. Machine Learning for Analysing Big Data

- ♦ Rapidly and automatically process and analyze enormous volumes of complex structured, semi-structured and unstructured data in big data
- ♦ Understand what machine learning is and to use some of the techniques for data classification (decision tree, k-NN, Support Vector Machines, neural networks, etc.)
- ♦ Learn how to divide data into a test set and a training set and discover the concepts of bias and variance

**Module 9. Data Mining Applied to Genomics**

- ♦ Learn how data mining allows us to find patterns and regularities in databases
- ♦ Learn to apply the principles of data mining to the analysis of large complex datasets (Big Data), including those in very large databases or on web pages
- ♦ Explore, analyze and leverage data and convert it into useful and valuable information for clinical practice

**Module 10. Techniques for extracting genomic data**

- ♦ Understand how most scientific data appear in documents such as web pages and PDF files that are difficult to process for further analysis, however, using scraping techniques they can be used to
- ♦ Access to many data sources through the web for the implementation of precision medicine by allowing massive extraction of information

**Module 11. New techniques in the age of genomics**

- ♦ Put into practice the knowledge acquired for the interpretation of a genomic study in several cancer cases by extracting useful information that will help in decision making
- ♦ Using several algorithms performed with the R language for the extraction of knowledge from Pubmed, DGIdb and Clinical Trials databases based on the search for genetic information in certain tumors

**Module 12. Application of Bioinformatics in Genomic Oncology**

- ♦ Understanding the function of genes with little clinical information based on ontological proximity
- ♦ Discover genes involved in a disease based on a massive Pubmed search and graphical representation of the level of scientific evidence

**Module 13. Breast Cancer**

- ♦ Perform a detailed diagnosis, with adequate staging of breast cancer
- ♦ Know the basics of early diagnosis of breast cancer, the target ages and differentiate screening for low, intermediate or high risk patients
- ♦ Distinguish the main subtypes of breast cancer, to know the predictive and prognostic factors that help to determine the best treatment, both in early and advanced disease
- ♦ Become familiar with the different genetic platforms, which help to decide which patients benefit and which do not benefit from adjuvant chemotherapy treatment
- ♦ Determine which treatment is most appropriate for each patient, based on disease subtype and stage of disease
- ♦ Know each of the available treatments for advanced disease, as well as the main toxicities derived from it, highlighting cyclin inhibitors (cdk4/6) and immunotherapy
- ♦ Understanding the disease and having clear ideas regarding the management of patients with advanced luminal, triple negative and HER 2 positive disease. Knowing which treatment should be chosen in each of the situations, both first line and successive

**Module 14. Lung Cancer**

- ♦ Perform an adequate diagnosis and staging of lung cancer, knowing the main diagnostic tests to be performed
- ♦ Understand the different stages of lung cancer and to apply the best treatment in each one of them
- ♦ Learn about the main studies aimed at lung cancer screening and the target population
- ♦ Be able to identify the histological subtypes of lung cancer. Differentiate between large cells and small cells
- ♦ Identify the main driver mutations (EGFR, ALK and ROS 1), as well as the role of PDL1. Targeted therapies, both tyrosine kinase inhibitors and immunotherapy. Main indications and toxicity

### **Module 15. ORL tumours**

- ♦ Manage the diagnosis and staging of the main ENT tumors
- ♦ Learn the most appropriate treatments according to tumor staging and location
- ♦ Have an in-depth knowledge of the treatments for metastatic disease, highlighting the most innovative ones, such as immunotherapy

### **Module 16. Colorectal cancer and anal canal**

- ♦ Perform an adequate diagnosis and staging of Colorectal Cancer
- ♦ Deepen in the indications for Colorectal Cancer screening and the main genetic syndromes that predispose to this disease
- ♦ Recognize in depth the different stages of Colon Cancer
- ♦ Point out the role of EGFR and the main prognostic factors of Colorectal Cancer
- ♦ Understand the most appropriate treatments both in the first line and in successive treatments
- ♦ Identify the role of immunotherapy in this setting
- ♦ Understand the role of neoadjuvant chemotherapy and the possibility of surgical salvage in colorectal cancer
- ♦ Become familiar with anal canal cancer and its main treatments

### **Module 17. Non-colorectal digestive tumors**

- ♦ Have an in-depth knowledge of the diagnosis and staging of pancreatic tumors
- ♦ Learn how to choose which type of treatment is indicated in each situation
- ♦ Be familiar with the main treatments available for metastatic pancreatic cancer, both for first line and successive treatments
- ♦ Have an in-depth knowledge of the diagnosis and staging of esophageal and gastric tumors, knowing the main treatments depending on the stage of the tumor

- ♦ Guiding the diagnosis and knowing the peculiarities of neuroendocrine tumors, knowing how to differentiate between secretory and non-secretory tumors. And know in depth the available treatments for this entity, highlighting the role of radionuclides
- ♦ Be familiar with the tests performed in the diagnosis of biliary tract tumors, staging and treatment

### **Module 18. Gynecologic Tumors**

- ♦ Learn in depth about the different gynecological tumors
- ♦ Be aware of the role of BRCA in ovarian cancer and its therapeutic implications
- ♦ Know how to differentiate a platinum-sensitive patient from a non-platinum-sensitive patient
- ♦ Be familiar with the indications of PARP inhibitors

### **Module 19. Urological tumors**

- ♦ Be able to treat urological tumors in each of their stages. Emphasizing the treatment with tyrosine kinase inhibitors and immunotherapy in renal cancer
- ♦ Know the BRAF mutation and its therapeutic implications
- ♦ Deepen in the treatment of melanoma in advanced stages
- ♦ Master the indications of immunotherapy and the combination of BRAF and MEK inhibitors

### **Module 20. Sarcomas and melanomas**

- ♦ Understand the different types of mesenchymal tumors, both soft tissue sarcoma, bone sarcoma and the peculiarities of GIST tumor
- ♦ Learn the indications of adjuvant treatment for each one of them
- ♦ Know the first line and successive treatments, both in soft tissue and bone sarcomas and GIST

### **Module 21. Brain Tumors**

- ♦ Learn about the role of immunotherapy in brain tumors
- ♦ Have an in-depth knowledge of the main brain tumors
- ♦ Distinguish them according to the molecular pattern
- ♦ Understand the most important prognostic factors

**Module 22. Radiotherapy**

- ♦ Understand the basics of radiotherapy treatment
- ♦ Learn the volumes to be treated and their names
- ♦ Determine the fundamental role of radiotherapy treatment in oncology
- ♦ Be familiar with the indications for radiotherapy treatment in breast cancer, lung cancer, ENT tumors, prostate cancer and digestive tumors
- ♦ Become familiar with the role of radiotherapy in less common tumors

**Module 23. Characterization and Fields of Application of Psycho-Oncology**

- ♦ Provide the necessary clinical knowledge of oncological disorders, epidemiology, etiology, risk factors, processes and diagnostic tests
- ♦ Train in the design and implementation of health promotion and cancer prevention and early detection programs
- ♦ Be able to argue about the area of study and the profession
- ♦ Identify the social needs of people with cancer and their families
- ♦ Analyze the influence of the perceived social support in cancer

**Module 24. Psychological Treatments in Cancer and Third Generation Therapies**

- ♦ Determine realistic treatment objectives together with the patient and/or their family
- ♦ Undergo training in the methods of intervention with cancer patients, especially empirically supported treatment techniques
- ♦ Identify those somatic symptoms and/or psychological alterations that are perceived by the patient as a threat
- ♦ Detect and enhance, as far as possible, the patient's own resources

**Module 25. Most Relevant Psychological Aspects According to Different Tumor Locations**

- ♦ Identify those somatic symptoms and/or psychological alterations that are perceived by the patient as a threat
- ♦ Compensate for, eliminate or attenuate such symptoms, symptom control
- ♦ Detect and enhance, as far as possible, the patient's own resources
- ♦ Facilitating adaptation to the disease during the biomedical treatment process (affecting anxiety, anguish, side effects of chemotherapy, phobias of radiotherapy devices, sexual dysfunctions and also hospital admissions)
- ♦ Encourage active coping styles
- ♦ Facilitate therapeutic adherence to medical treatment

**Module 26. Protocols for Emotional Intervention at the End of Life**

- ♦ Perform preventive care actions for the family according to the stages of the disease
- ♦ Address conflicts that may arise as a result of different socio-cultural beliefs and values between the team and the patient-family binomial
- ♦ Recognize and respond to spiritual distress and know how to refer the patient to the appropriate professional
- ♦ Develop appropriate assessments of the overall importance of the patient's spiritual beliefs and religious practices
- ♦ Manage the attitudes and responses of patients, caregivers and professionals derived from the professional-patient relationship
- ♦ Know how to intervene in particularly complex family situations
- ♦ Be able to work in cooperative groups and multi-professional teams

### Module 27. Evaluation and Measurement Instruments

- ♦ Evaluate the complex psychological problems
- ♦ Apply assessment procedures and instruments for specific symptoms
- ♦ Acquire the training and practice to conduct quality of life assessment; plan the assessment and use specific instruments, conduct functional analysis, case formulation and reporting
- ♦ Assess family threats, needs and resources, and know how to apply family assessment tools
- ♦ Manage comprehensive assessment tools in palliative and end-of-life care

### Module 28. Communication with the Oncologic Patient

- ♦ Work with a Patient-Centered Psychology
- ♦ Appropriately handle difficult situations and dealing with bad news
- ♦ Prevent and detect communication problems (e.g., pact of silence) and enhance family members' resources and strategies
- ♦ Manage the most complex communication difficulties
- ♦ Reflect critically on one's own attitudes and communication skills, identifying elements for continuous improvement during the care process

### Module 29. Grief Management

- ♦ Prevent the onset of complicated grief prior to death as much as possible
- ♦ Continue to prevent the onset of complicated grief after the death, providing emotional support and the tools that help the person to say goodbye to their loved one
- ♦ Provide guidance in carrying out bereavement tasks
- ♦ Develop the capacity for empathy, listening and compassion that allows us to be in tune with the patient's pain, without over-involvement and, at the same time, create a sufficiently strong therapeutic bond in the face of difficulties that may arise in the process

### Module 30. Other Psychological Interventions in Specific Cancer-Related Areas

- ♦ Perform in-depth management of the combined protocol for the smoking withdrawal process and relapse prevention
- ♦ Perfect the skills and competencies necessary for the selection, training and supervision of volunteers
- ♦ Detect the psychological factors associated with participation in cancer *screening* and genetic counseling programs, as well as to encourage participation in them by increasing the perception of control
- ♦ Analyze the use and some of the advantages of group therapy compared to individual treatment
- ♦ Gain in-depth knowledge of psychological preparation programs for the different medical oncological treatments and their side effects
- ♦ Be able to identify and mitigate the sequelae that remain in cancer survivors



**Module 31. Research in Cancer**

- ♦ Design, develop and implement a research project
- ♦ Formulate scientific research hypotheses
- ♦ Analyze results and draw conclusions
- ♦ Train in scientific communication of research results
- ♦ Establish the ethical limitations of a research project
- ♦ Have the ability to apply empirical evidence in patient care
- ♦ Gain knowledge of good clinical practice guidelines and ethics committee standards

**Module 32. Ethical Aspects in Psycho-Oncology and Psychology of Palliative Care**

- ♦ Analyze ethical dilemmas in depth and from an interdisciplinary perspective
- ♦ Identify bioethical problems in the conduct of professionals, in health care activities or in biomedical research
- ♦ Argue decisions in the biomedical field with well-founded ethical value judgments
- ♦ Develop expressive and communicative skills on bioethical issues in order to be able to interact in an ethics committee environment



*Learn from experts in medical oncology and expand your knowledge in specific areas such as third-generation therapies and communication with the oncology patient”*

# 03 Skills

Throughout the program, specialists will develop clinical, investigative and emotional competencies in order to effectively face the current challenges in the field of oncology. Participants will acquire skills in the use of precision therapies, analysis of genomic data, management of psychological and ethical issues, communication with the oncology patient, as well as in the application of research and evaluation techniques.





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*Acquire advanced clinical competencies in the comprehensive management of cancer, including the application of precision therapies and the analysis of genomic data for informed clinical decision making”*



## General Skills

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- ♦ Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
- ♦ Apply acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study
- ♦ Integrate knowledge and face the complexity of making judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments
- ♦ Communicate its conclusions - and the ultimate knowledge and rationale behind them - to specialized and non-specialized audiences in a clear and unambiguous manner
- ♦ Acquire the learning skills that will enable further studying in a largely self-directed or autonomous manner
- ♦ Manage the different therapeutic options, as well as the treatment schedule for each of the neoplasms
- ♦ Know the latest advances in the treatment of these diseases, both from the point of view of medical oncology and radiation oncology
- ♦ Identify the most innovative treatments
- ♦ Perform assessment and diagnosis to start treatment in cancer patients
- ♦ Know the area of study and the profession for a better understanding of the disease
- ♦ Use information and communication technologies to keep abreast of new developments in the disease
- ♦ Improve skills in searching, processing and analyzing information from various sources
- ♦ Make decisions under stress



## Specific Skills

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- ♦ Create a global and updated vision of the exposed topics that will allow the student to acquire useful knowledge and at the same time, generate interest in expanding the information and discovering its application in their daily practice
- ♦ Understand the knowledge discovery process, including data selection, cleaning, coding, the use of different statistical and machine learning techniques and the visualization of the generated structures
- ♦ Understand how to evaluate the performance of supervised and unsupervised learning algorithms
- ♦ Learn how functions normally return only one value to the program unit, unlike procedures that can return zero, one or several values
- ♦ Learn the biological databases that have emerged in response to the enormous amount of data generated by DNA sequencing technologies. Data stored in biological databases are organized for optimal analysis and are characterized by being complex, heterogeneous, dynamic and yet inconsistent due to the lack of standards at the ontological level
- ♦ Understand the role of radiotherapy as palliation in cancer patients
- ♦ Be fully aware of the treatment of low grade and high grade tumors and their differences
- ♦ Perfectly understand the role of surgery and sentinel node in the treatment of melanoma, as well as the indications for adjuvant treatment
- ♦ Know the diagnosis, prognosis, staging and main risk factors of melanoma
- ♦ Learn in depth about the treatment of uterine cancers (both endometrial and cervical cancers and sarcomas), in early and advanced stages
- ♦ Understand the different types of urological tumors, the diagnosis, peculiarities and staging of each one of them

- Be familiar with the tests necessary for the diagnosis and staging of ovarian cancer
- Be a specialist in the treatment of ovarian cancer, tubal tumors and primary peritoneal carcinoma in each of its phases
- Know the first line and successive treatments
- Be familiar with the most innovative treatments for each of the different digestive tumors
- Learn the procedure and the main diagnostic tests to be performed in the case of hepatocarcinoma. As well as the most appropriate treatments, including the role of immunotherapy and newer therapies
- Know in which cases adjuvant chemotherapy is indicated, and in which cases it is not. And which treatment is applied in each case
- Learn about the particularities of rectal cancer and its treatment in localized disease
- Develop students' empathic skills in dealing with terminally ill patients
- Identify the patients' strengths in order to motivate them to continue with treatment
- Help facilitate the patient's adaptation to his new reality, before, during and after treatment
- Develop plans to help families and patients cope with grief
- Know how to identify between maladaptive emotions and behaviors to prevent patients from self-injury





- Work on self-care to avoid job stress
- Develop coping plans when faced with the news of a terminal illness
- Improve communication skills to have assertive discussions with the patient's family members
- Help the different professionals involved in the patient's treatment to communicate with the family

“*Delve into the use of bioinformatics tools and data analysis techniques for the interpretation of genomic information and the application of bioinformatics in genomic oncology*”

04

# Course Management

The teaching staff of the Advanced Master's Degree in Comprehensive Medical Oncology is made up of renowned specialists in the main areas of this specialty. The teachers are experts in the field, with extensive clinical and research experience, which guarantees quality and updated teaching. Participants will have the opportunity to have access to the clinical practice of the professors, analyzing practical cases from their own experience.







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*The teachers are based on the latest scientific evidence and the best clinical practices, which guarantees a teaching adapted to the most demanding oncological reality"*

## Management



### Dr. Oruezábal Moreno, Mauro Javier

- ♦ Head of the Medical Oncology Department at the University Hospital Rey Juan Carlos, Madrid
- ♦ PhD in Medicine from the Complutense University of Madrid (UCM)
- ♦ Master's Degree in Bioinformatics and Biostatistics, Universitat Oberta de Catalunya (UOC)
- ♦ Master's Degree in Bioinformatics Analysis from the Pablo de Olavide University
- ♦ Research Fellow at University of Southampton
- ♦ Graduate in Medicine and Surgery from the Universidad de Navarra
- ♦ Member of: Spanish Society of Medical Oncology, the Spanish Group of Digestive Tumors (TTD)



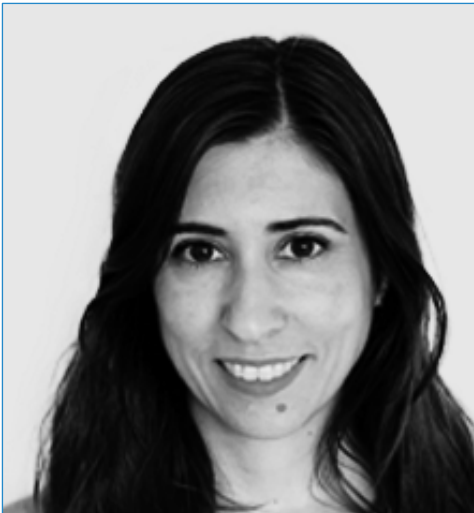
### D. Krallinger, Martin

- ♦ Head of Text Mining at the *Barcelona Supercomputing Center*(BSC)
- ♦ Former Head of the Text Mining Unit at the Spanish National Cancer Research Center (CNIO)
- ♦ Researcher with more than 70 publications
- ♦ Participation in the development of the first biomedical text annotation metaserver (biocreative metaserver-BCMS) and the BeCalm metaserver
- ♦ Organizer of BioCreative community evaluation challenges for the evaluation of natural language processing tools and has participated in the organization of biomedical text mining tasks in various international community challenges, including IberEval and CLEF



### **Dr. Olier Gárate, Clara**

- Medical Oncology specialist at the University Hospital Fundación Alcorcón
- Physician via MIR for specialization in Oncology at the University Clinic of Navarra
- Specialist in the area of breast cancer, CNS, melanoma, sarcoma, and genetic counseling
- Degree in Medicine from the University of Navarra



### **Dr. Moreno Muñoz, Diana**

- Medical Oncology specialist at the University Hospital Fundación Alcorcón
- PhD in the Biomedicine Program at the University of Cordoba



### Mr. Garrido Jiménez, Sergio

- ♦ Director of the Psychosocial Care Team at the Spanish Association Against Cancer in Jaen
- ♦ Psycho-oncologist in the Medical Oncology Unit at the Jaén Hospital Complex
- ♦ Psycho-oncologist in the Oncohematology Unit at the Doctor Sagaz University Hospital
- ♦ Psychologist in the Pain Unit at the San Agustín University Hospital
- ♦ Psychologist in the Palliative Care Unit at the Hospital San Juan de la Cruz
- ♦ Psychologist in the Home Care Unit at the Alto Guadalquivir Hospital
- ♦ General Health Psychologist for the Junta de Andalucía
- ♦ Master's Degree in Psycho-Oncology from the Complutense University of Madrid
- ♦ Degree in Psychology from the University of Jaén
- ♦ Member of: Spanish Society of Psycho-Oncology; Spanish Association of Health Psychology (AEPSIS); Ethics Committee for Research with Medicines (CEIm); Provincial de Jaén - Research Ethics Committee

## Professors

### Dr. Alberich Martí, Ricardo

- ♦ Specialist in Mathematical Sciences and Computer Science
- ♦ Member of the Computational Biology and Bioinformatics Research Group (BIOCOM)
- ♦ Professor of Mathematical and Computer Sciences and Computer Science and Artificial Intelligence at the University of the Balearic Islands (UIB)

### D. Andrés León, Eduardo

- ♦ Head of the Bioinformatics Unit at the Institute of Parasitology and Biomedicine "López-Neyra" - CSIC"
- ♦ Associate Editor at BMC Genomics
- ♦ *Academic Editor* at Public Library of Science (PLOS One)
- ♦ Biostatistician at the Familial Hypercholesterolemia Foundation
- ♦ Technician in charge of the Central Unit of Bioinformatics and Computational Biology at the Institute of Biomedicine in Seville
- ♦ Degree in Biology and Molecular Biology, Universidad Autónoma de Madrid

**Dr. Álvarez Cubero, María Jesús**

- ♦ Researcher and professor
- ♦ Professor of the Department of Biochemistry Molecular Biology and III and Immunology, University of Granada
- ♦ Genyo Researcher
- ♦ PhD in Biology, University of Granada
- ♦ Degree in Biology from the University of Granada
- ♦ Research stay at the University of North Texas
- ♦ Research stay at the University of Coimbra, Portugal
- ♦ Research stay at the Universitat Tor Vergata

**Dr. Astudillo González, Aurora**

- ♦ PhD in Medicine and former Scientific Director of the Biobank of the Principality of Asturias
- ♦ Former Professor of Pathological Anatomy at the University of Oviedo
- ♦ Professor at the University of Oviedo and linked to the Central University Hospital of Asturias
- ♦ TEDx Talks Speaker
- ♦ European Board of Neuropathology
- ♦ European Board of Pathology

**Dr. Burón Fernández, María del Rosario**

- ♦ Physician of the Internal Medicine Department at the Infanta Cristina University Hospital
- ♦ Specialist in Internal Medicine
- ♦ Degree in Medicine and Surgery

**Dr. Carmona Bayonas, Alberto**

- ♦ Medical Oncology Service at Morales Meseguer University Hospital. Murcia, Spain
- ♦ Hematology and Medical Oncology Service at the University Hospital Morales Meseguer. Murcia, Spain

**Dr. Ciruelos Gil, Eva Maria**

- ♦ Coordinator of the Breast Cancer Unit of HM Hospitals
- ♦ Oncologist at the 12 de Octubre University Hospital
- ♦ Professor of the Department of Medicine at the Complutense University of Madrid
- ♦ Degree in Medicine and Surgery from the Autonomous University of Madrid
- ♦ Specialist in Medical Oncology at the 12 de Octubre University Hospital
- ♦ Member of the SOLTI Breast Cancer Research Group (President), Breast Pathology Working Group of the Breast Cancer Unit of the Hospital Universitario 12 de Octubre, Hospital Pharmacy Commission of the 12 de Octubre University Hospital., ANEP

**Dr. De Andrés Galiana, Enrique**

- ♦ PhD in Mathematics and Computer Engineering
- ♦ Associate Professor of Computer Science in the Department of Mathematics at the University of Oviedo
- ♦ ITM Automation at CSC
- ♦ Programmer Analyst at OMVESA
- ♦ PhD in Mathematics and Statistics from the University of Oviedo
- ♦ Computer Engineer at the University Pontificia of Salamanca
- ♦ MSC SoftComputing, Intelligent Data Analysis and Artificial Intelligence from the University of Oviedo

**Dr. De la Haba-Rodríguez, Juan**

- ♦ Specialist in Medical Oncology the Reina Sofía University Hospital
- ♦ Specialist in Medical Oncology at San Juan de Dios Hospital
- ♦ Researcher at IMIBIC

- ♦ Professor of Oncology at the University of Cordoba
- ♦ PhD in Medicine from the University of Córdoba
- ♦ Member of the New Cancer Therapies Group at the Maimonides Institute of Biomedical Research of Cordoba (IMIBIC)
- ♦ Acknowledgements: Averroes de Oro Ciudad de Córdoba Award in Medical Sciences, Special Mention in the Al-Andalus Awards, Bandera de Andalucía a los Valores Humanos (Andalusian Flag for Human Values)

**Mr. Fernández Martínez, Juan Luis**

- ♦ CEO and Co-Founder of StockFink
- ♦ Co-Founder of DeepBioInsights
- ♦ Professor of Applied Mathematics
- ♦ Director of the Inverse Problems, Optimization and Machine Learning Group in the Department of Mathematics, University of Oviedo

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- ♦ Coordinator of the Epithelial Plasticity and Metastasis Group at the Institute of Biomedical Research of A Coruña
- ♦ Stays at the National Institute of Health in the USA and in Australia. USA and Australia
- ♦ PhD in Molecular Biology from the Autonomous University of Madrid (UAM)
- ♦ Degree in Biology from the Complutense University of Madrid (UCM)

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- ♦ Molecular Biologist at the Laboratory of Molecular Biology of the Valencian Institute of Oncology Foundation
- ♦ Researcher at the La Fe University Hospital
- ♦ PhD in Molecular Genetics from the University of Valencia
- ♦ Degree in Science Biology from the University of Valencia

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- ♦ Director of the Oncohealth Institute
- ♦ Director of the Chair of Molecular Individualized Medicine in the Autonomous University of Madrid
- ♦ Director of the Oncology Department of the University Hospital Fundación Jiménez Díaz
- ♦ Director of the Translational Oncology Division of the Health Research Institute (FJD-UAM)
- ♦ Specialist in Oncology
- ♦ Professor of Oncology at the Autonomous University of Madrid

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- ♦ CEO and Co-Founder at Frogames
- ♦ Principal CEO at Flyleaf Studios
- ♦ Professor of Computer Science and Artificial Intelligence at the University of the Balearic Islands
- ♦ New Technologies Instructor at Udemy
- ♦ Game Producer & Project Manager in Playspace
- ♦ Degree in Mathematics from the University of the Balearic Islands

**Dr. González Gomáriz, José**

- ♦ Health Researcher at the Institute of Health Research of Navarra (IdiSNA)
- ♦ Healthcare Trainer
- ♦ Master's Degree in Bioinformatics, University of Murcia

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- ♦ Assistant Physician of the Medical Oncology Service at the Rey Juan Carlos Hospital
- ♦ Assistant Physician of the Medical Oncology Service at the Fundación Alcorcón University Hospital
- ♦ Assistant Physician of the Medical Oncology Department at the Infanta Sofia University Hospital
- ♦ Assistant Physician of the Medical Oncology Department at the 12 de Octubre University Hospital
- ♦ Volunteer in Health Campaign in Cameroon with ONGD Zerca y Lejos
- ♦ Degree in Medicine from the Complutense University of Madrid (UCM)

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- ♦ Data Architect at Accenture
- ♦ Data Scientist at Pragsis Bidoop
- ♦ Technical Researcher at the Supercomputing Center of Barcelona
- ♦ Technical Researcher at Dinycon Sistemas
- ♦ Researcher at IXA PNL Research Group
- ♦ Graphic Designer at Akimu Proyectos Turísticos
- ♦ PhD in Natural Language Processing the University of the Basque Country/*Euskal Herriko Unibertsitatea* (UPV/EHU)
- ♦ Graduate in Management Informatics at Albert-Ludwig University
- ♦ Master in Language Analysis and Processing, University of the Basque Country/*Euskal Herriko Unibertsitatea*(UPV/EHU)

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- ♦ Medical Oncologist in the Digestive and Endocrine Tumors Section at the Central de Asturias University Hospital
- ♦ PhD in Medicine from the University of Oviedo
- ♦ Researcher and Coordinator of scientific studies for the Spanish Group of Neuroendocrine and Endocrine Tumors (GETNE)
- ♦ Researcher and Coordinator of scientific studies for the Spanish Society of Medical Oncology (SEOM)
- ♦ Coordinator of the ICARO Registry of Adrenocortical Cancer in the Spanish Society of Endocrinology and Nutrition (SEEN)
- ♦ President of the AGAMENON Gastric Cancer Research Group of the Spanish Society of Medical Oncology (SEOM)
- ♦ Member of the Spanish Society of Endocrinology and Nutrition (SEEN), Spanish Society of Medical Oncology (SEOM), TTD (Board of Directors)

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- ♦ Medical Specialist in Oncology
- ♦ Physician of the Oncology Department at the Fundación Jiménez Díaz University Hospital
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- ♦ Degree in Medicine and Surgery
- ♦ Member of the Spanish Society of Medical Oncology

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- ♦ Clinical Head of the Molecular Biology Laboratory of the Medical Oncology Service at the Instituto Valenciano de Oncología (IVO)
- ♦ PhD in Biology

**Dr. López López, Rafael**

- ♦ Head of the Medical Oncology Department at the Santiago de Compostela University Hospital Complex
- ♦ Director of the Translational Medical Oncology Group at the Health Research Institute of Santiago de Compostela
- ♦ Creator of the Medical Oncology Service at the Txagorritxu Hospital. Vitoria, Spain
- ♦ Research Physician at the Oncology Department of the Free University Hospital. Amsterdam
- ♦ Principal Investigator of more than 100 clinical trials, highlighting the field of Translational Research in Solid Tumors
- ♦ Author of more than 200 articles in prestigious national and international journals
- ♦ Founding Partner of the company Nasasbiotech
- ♦ Degree in Medicine from the Autonomous University of Madrid (UAM)
- ♦ Numerary member of the Royal Academy of Medicine and Surgery of Galicia
- ♦ Member of the European Society for Medical Oncology (ESMO), Spanish Society for Medical Oncology (SEOM), American Society of Clinical Oncology (ASCO), American Association for Cancer Research (AACR)







**Dr. Martínez González, Luis Javier**

- ◆ Head of the Genomics Unit of the Genomics and Oncology Research Center (GENYO)
- ◆ Researcher of the genetic identification project of Christopher Columbus and his relatives
- ◆ PhD with extraordinary award in the Area of Biomedicine from the University of Granada
- ◆ Degree in Biological Sciences from the University of Granada
- ◆ Expert in Biotechnology from the National Distance University

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- ◆ Researcher at the Alberto Sols Biomedical Research Institute
- ◆ Leader of the Epithelial Research Plasticity and Metastasis Group at the Institute of Biomedical Research of A Coruña.(INIBIC)
- ◆ PhD in Biomedicine from the Autonomous University of Madrid
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- ♦ Oncologist at the University Hospital of La Princesa
- ♦ Oncologist at the 12 de Octubre University Hospital

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- ♦ Bioinformatics in the Hospital Virgen del Rocio University Hospital
- ♦ Graduate in Biotechnology from the Pablo de Olavide University
- ♦ Master in Regenerative Biomedicine from the University of Granada

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- ♦ Head of the Pediatric Pathology Section at Clinic Hospital of Barcelona
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- ♦ University Diploma in Health Technology Assessment from the Pompeu Fabra University
- ♦ Master's Degree in Pharmaceutic Sciences at Complutense University of Madrid (UCM)

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- ♦ Director of the Soft Management of Internet and Learning (SMILe) Research Group
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- ♦ Research Collaborator at the Artificial Intelligence Center at SRI International, Stanford University
- ♦ Research Collaborator of the Aerospace Engineering and Services Group (INSA-NASA)
- ♦ Director of the IT Department at Project & Portfolio Management (PPM)
- ♦ Consultant in Intelligent Systems for companies such as Southco, Danone or ATT
- ♦ Member of the Spanish Association for Artificial Intelligence

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- ♦ Full Professor in the areas of Mathematical and Computer Sciences, Computer Science and Artificial Intelligence

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- ♦ PhD in Engineering from the Universidade Federal do Rio Grande do Sul
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- ♦ PhD in Molecular Biochemistry and Biology from the Complutense University of Madrid (UCM)
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- ♦ Specialty in Medical Oncology at the University Hospital Fundación Alcorcón
- ♦ Degree in Medicine from the Catholic University of Santiago de Guayaquil

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- ♦ Postgraduate Diploma in Breast Radiology from the University of Barcelona
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- ♦ Master's Degree in Molecular Oncology at the Spanish National Cancer Research Center (CNIO)
- ♦ Member of the Mortality Commission at the Fundación Alcorcón University Hospital
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- ♦ Degree in Medicine and Surgery from the Autonomous University of Madrid

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- ♦ Degree in Medicine and Surgery from the Rey Juan Carlos I University

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- ♦ Medical Oncology Specialist at the University Hospital Fundación Alcorcón
- ♦ Professor of Oncology, Rey Juan Carlos University
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- ♦ Specialty in Immuno-Oncology at the University Clinic of Navarra
- ♦ Master's Degree in Palliative Care from the University of Valladolid
- ♦ Master's Degree in Research Methodology from the Autonomous University of Barcelona
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- ◆ Specialist in Medical Oncology
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- ◆ Medical Specialist in Radiation Oncology at the University Hospital of Fuenlabrada
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- ◆ Degree in General Medicine from the Faculty of Medicine of the Autonomous University of Madrid

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- ◆ Attending Orthopedic Surgery and Traumatology physician at the Fundación Alcorcón University Hospital
- ◆ Assistant Physician in the Orthopedic Surgery and Traumatology Service at Quirónsalud University Hospital. Madrid
- ◆ Specialist in Orthopedic and Digestive System Surgery at the Fundación Alcorcón University Hospital
- ◆ Degree in Medicine and Surgery from the Autonomous University of Madrid
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- ♦ Psychologist and Criminologist
- ♦ Principal Investigator for Spain of the European project Net-Care (Networking and Caring For Migrant And Refugee Women)
- ♦ Director of the project of the State Pact on Prevention and Intervention in Gender Violence
- ♦ Professor of Psychology at the University of Jaén
- ♦ Gestalt Therapist
- ♦ Scientific Advisor of the Commissions of Palliative Care of the Western Andalusia Official College of Psychology
- ♦ Author of books such as "Las princesas que juegan al fútbol y los príncipes que saltan a la comba. Student awareness of the presence of stereotypes and strategies to avoid their influence on decision making", "Empatas. Why are there people who can't watch the news?"
- ♦ Psychologist and Criminologist, University of Granada
- ♦ PhD in Psychology, University of Granada
- ♦ Member of: President of the Association of Psychological Health Centers (ACESAP)

#### **Dr. Ortega Armenteros, María Carmen**

- ♦ Physician in the Palliative Care Support Team. Jaen Hospital Complex
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- ♦ Physician in the Home Care Unit of the Spanish Association Against Cancer in collaboration with the Andalusian Health Service
- ♦ PhD in Medicine
- ♦ Degree in Medicine and Surgery. University of Granada
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- ♦ Master's Degree in Palliative Care University of Valladolid (UVA)
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- ♦ Psycho-oncologist at the Spanish Association Against Cancer (AECC)
- ♦ Psychologist at Clínica de Rehabilitación Integral Bartolomé Puerta, interdisciplinary center
- ♦ Degree in Psychology from the University of Jaén
- ♦ Specialist in Child Psychology and Neuropsychology at Euroinnova International Online Education
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- ♦ Specialist in Medical Oncology
- ♦ Assistant Physician, Medical Oncology Department Jaen University Hospital
- ♦ Secretary of the Thoracic Tumor Subcommittee. Jaen University Hospital
- ♦ Founding Partner Association of Bioethics and Law (ABD)
- ♦ Teaching Coordinator of multiple clinical sessions accredited by the Health Quality Agency of Andalusia
- ♦ Tutor of Medical Oncology Residents. Jaen University Hospital
- ♦ Degree in Medicine and Surgery. University of Granada
- ♦ Full PhD and Research Sufficiency in advances in Radiology (Diagnostic and Therapeutic), Physical Medicine and Medical Physics. University of Granada

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- ♦ Expert psychologist in Emergencies and Disasters
- ♦ PhD in Psychology
- ♦ Collaborator in various volunteer programs, health programs, programs for people at risk of social exclusion or vulnerable and employment orientation programs
- ♦ Member of: Psychology Office (GP); University of Jaén; Psychosocial Analysis of Behavior in the New Social Reality Research Group (HUM-651); Psychological Evaluation and Intervention Group (HUM-836)

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- ♦ Medical Oncology specialist at the Nuestras Señora de Candelaria University Hospital
- ♦ Specialist in Oncology at the Alcorcón Foundation University Hospital
- ♦ Stay at Capital & Coast District Health Board. Wellington Regional Hospital
- ♦ Stay at Melanoma Institute Australia
- ♦ Stay at Sinai Health System
- ♦ Specialised in Physical Exercise and Oncology from the Autonomous University of Madrid
- ♦ Master in Medical Oncology from the University of Girona
- ♦ Master in Neoplasms of the thoracic cavity by the University Alfonso X el Sabio
- ♦ Master's Degree in Molecular Oncology from Rey Juan Carlos University
- ♦ Degree in Medicine from the Autonomous University of Madrid

# 05

## Structure and Content

The Advanced Master's Degree in Comprehensive Medical Oncology has a carefully designed structure and content to offer a complete and enriching learning experience. The program includes a variety of multimedia resources, detailed videos, complementary readings and clinical guides that provide an innovative and effective approach in the process of updating participants.







“

*You will have access to a wide variety of multimedia resources such as interactive presentations, in-depth videos and recorded lessons, which offer a dynamic and visual approach to learning”*

## Module 1. Molecular Biology

- 1.1. Molecular Mechanisms of Cancer
  - 1.1.1. Cellular Cycle
  - 1.1.2. Detachment of Tumor Cells
- 1.2. Reprogramming of the Tumor Microenvironment
  - 1.2.1. Tumor Microenvironments: An Overview
  - 1.2.2. TME as a Prognostic Factor in Lung Cancer
  - 1.2.3. TME in the Progression and Metastasis of Lung Cancer
    - 1.2.3.1. Cancer-Associated Fibroblasts (CAF)
    - 1.2.3.2. Endothelial Cells
    - 1.2.3.3. Hypoxia in Lung Cancer
    - 1.2.3.4. Inflammation
    - 1.2.3.5. Immune Cells
  - 1.2.4. Contribution of TME to Therapeutic Resistance
    - 1.2.4.1. Contribution of TME to Radiotherapy Resistance
  - 1.2.5. TME as a Target Treatment in Lung Cancer
    - 1.2.5.1. Future Directions
- 1.3. Tumor Immunology: Basis of Cancer Immunotherapy
  - 1.3.1. Introduction to the Immune System
  - 1.3.2. Tumor Immunology
    - 1.3.2.1. Tumor-Associated Antigens
    - 1.3.2.2. Identification of Tumor-Associated Antigens
    - 1.3.2.3. Types of Tumor-Associated Antigens
  - 1.3.3. The Bases of Immunotherapy in Cancer
    - 1.3.3.1. Introduction to the Immunotherapeutic Approaches
    - 1.3.3.2. Monoclonal Antibodies in Cancer Therapy
      - 1.3.3.2.1. Production of Monoclonal Antibodies
      - 1.3.3.2.2. Types of Therapeutic Antibodies
      - 1.3.3.2.3. Mechanisms of Action of Antibodies
      - 1.3.3.2.4. Modified Antibodies
  - 1.3.4. Non-Specific Immune Modulators
    - 1.3.4.1. Bacillus of Calmette-Guérin
    - 1.3.4.2. Interferon- $\alpha$
    - 1.3.4.3. Interleucina-2
    - 1.3.4.4. Imiquimod

- 1.3.5. Other Approaches for Immunotherapy
  - 1.3.5.1. Dendritic Cell Vaccines
  - 1.3.5.2. Sipuleucel-T
  - 1.3.5.3. CTLA-4 Blocking
  - 1.3.5.4. Adoptive T-cell Therapy
    - 1.3.5.4.1. Adoptive Cell Therapy With T-cell Clones
    - 1.3.5.4.2. Adoptive Cell Therapy With Tumor-Infiltrating Lymphocytes
- 1.4. Molecular Mechanisms Involved in the Invasion and Metastasis Process

## Module 2. Genomic or precision oncology

- 2.1. Use of Gene Expression Profiling in Cancer
- 2.2. Molecular Subtypes of Breast Cancer
- 2.3. Prognostic-Predictive Genomic Platforms in Breast Cancer
- 2.4. Therapeutic Targets in Non-Small Cell Lung Cancer
  - 2.4.1. Introduction
  - 2.4.2. Molecular Detection Techniques
  - 2.4.3. EGFR Mutation
  - 2.4.4. ALK Translocation
  - 2.4.5. ROS Translocation
  - 2.4.6. BRAF Mutation
  - 2.4.7. NRTK Rearrangements
  - 2.4.8. HER2 Mutation
  - 2.4.9. MET Mutation/Amplification
  - 2.4.10. RET Rearrangements
  - 2.4.11. Other Molecular Targets
- 2.5. Molecular Classification of Colon Cancer
- 2.6. Molecular Studies in Gastric Cancer
  - 2.6.1. Treatment of Advanced Gastric Cancer
  - 2.6.2. HER2 Overexpression in Advanced Gastric Cancer
  - 2.6.3. Identification and Interpretation of HER2 Overexpression in Advanced Gastric Cancer
  - 2.6.4. Drugs With Activity Against HER2
  - 2.6.5. Trastuzumab in the First Line of Advanced Gastric Cancer
    - 2.6.5.1. Treatment of HER2+ Advanced Gastric Cancer After Progression to Trastuzumab-Based Regimens
  - 2.6.6. Activity of Other Anti-HER2 Drugs in Advanced Gastric Cancer



- 2.7. GIST as a Model of Translational Research: 15 Years of Experience
  - 2.7.1. Introduction
  - 2.7.2. Mutations of KIT and PDGFRA as Major Promoters in GIST
  - 2.7.3. Genotype in GIST: Prognostic and Predictive Value
  - 2.7.4. Genotype in GIST and Resistance to imatinib
  - 2.7.5. Conclusions
- 2.8. Molecular and Genomic Biomarkers in Melanoma
- 2.9. Molecular Classification of Brain Tumors
- 2.10. Molecular and Genomic Biomarkers in Melanoma
- 2.11. Immunotherapy and Biomarkers
  - 2.11.1. Landscape of Immunological Therapies in Cancer Treatment and the Need to Define the Mutational Profile of a Tumor
  - 2.11.2. Checkpoint Inhibitor Biomarkers: PD-L1 and Beyond
    - 2.11.2.1. The Role of PD-L1 in Immune Regulation
    - 2.11.2.2. Clinical Trial Data and PD-L1 Biomarker
    - 2.11.2.3. Thresholds and Assays for PD-L1 Expression: a Complex Picture
    - 2.11.2.4. Budding Biomarkers
      - 2.11.2.4.1. Tumor Mutational Burden (TMB)
        - 2.11.2.4.1.1. Quantification of the Tumor Mutational Burden
        - 2.11.2.4.1.2. Evidence of the Tumor Mutational Burden
        - 2.11.2.4.1.3. Tumor Burden as a Predictive Biomarker
        - 2.11.2.4.1.4. Burden as a Prognosis Biomarker
        - 2.11.2.4.1.5. The Future of the Mutational Burden
      - 2.11.2.4.2. Microsatellite Instability
      - 2.11.2.4.3. Immune Infiltrate Analysis
      - 2.11.2.4.4. Toxicity Markers
    - 2.11.2.3. Immune Checkpoint Drug Development in Cancer
    - 2.11.4. Available Drugs

### Module 3. Changes in Current Clinical Practice and New Applications With Genomic Oncology

- 3.1. Liquid Biopsies: Fashion or Future?
  - 3.1.1. Introduction
  - 3.1.2. Circulating Tumor Cells
  - 3.1.3. ctDNA
  - 3.1.4. Clinical Applications
  - 3.1.5. CtDNA Limitations
  - 3.1.6. Conclusions and Future
- 3.2. Role of the Biobank in Clinical Research
  - 3.2.1. Introduction
  - 3.2.2. Is it Worth the Effort to Create a Biobank?
  - 3.2.3. How to Begin Establishing a Biobank?
  - 3.2.4. Informed Consent for the Biobank
  - 3.2.5. Collecting Samples for the Biobank
  - 3.2.6. Quality Control
  - 3.2.7. Access to Samples
- 3.3. Clinical trials: New Concepts Based on Precision Medicine
  - 3.3.1. What Are Clinical Trials? What Sets Them Apart From Other Types of Research?
    - 3.3.1.1. Types of Clinical Trials
      - 3.3.1.1.1. By Their Objectives
      - 3.3.1.1.2. By The Number of Partaking Centers
      - 3.3.1.1.3. By Their Methodology
      - 3.3.1.1.4. By Their Level of Masking
  - 3.3.2. Results of Clinical Trials in Thoracic Oncology
    - 3.3.2.1. Related to Survival Time
    - 3.3.2.2. Results Related to the Tumor
    - 3.3.2.3. Results Notified by the Patient
  - 3.3.3. Clinical Trials in the New Age of Precision Medicine
    - 3.3.3.1. Precision Medicine
    - 3.3.3.2. Terminology Relate to the Design of Trials in the Era of Precision Medicine
- 3.4. Incorporation of Actionable Markers in Clinical Practice
- 3.5. Application of Genomics in Clinical Practice by Type of Tumor
- 3.6. Decision support Systems in Oncology Based on Artificial Intelligence

### Module 4. Use of Unix and Linux in Bioinformatics

- 4.1. Introduction to the Linux Operating System
  - 4.1.1. What is an Operating System?
  - 4.1.2. The Benefits of Using Linux
- 4.2. Linux Environment and Installation
  - 4.2.1. Linux Distributions
  - 4.2.2. Linux Installation Using a USB Memory
  - 4.2.3. Linux Installation Using a CD-ROM
  - 4.2.4. Linux Installation Using an Virtual Machine
- 4.3. The Command Line
  - 4.3.1. Introduction
  - 4.3.2. What is a Command Line?
  - 4.3.3. Working on the Terminal
  - 4.3.4. Shell and Bash
- 4.4. Basic Browsing
  - 4.4.1. Introduction
  - 4.4.2. How to Learn the Current Location?
  - 4.4.3. Absolute and Relative Routes
  - 4.4.4. How to Navigate in the System?
- 4.5. File Manipulation
  - 4.5.1. Introduction
  - 4.5.2. How to Build a Directory?
  - 4.5.3. How to Move to a Directory?
  - 4.5.4. How to Create an Empty File?
  - 4.5.5. Copying a File and Directory
  - 4.5.6. Deleting a File and Directory
- 4.6. VI Text Editor
  - 4.6.1. Introduction
  - 4.6.2. How to Save and Exit?
  - 4.6.3. How to Browse a File in the VI Text Editor?
  - 4.6.4. Deleting Contents
  - 4.6.5. The Undo Command
- 4.7. Wildcards
  - 4.7.1. Introduction
  - 4.7.2. What are Wildcards?
  - 4.7.3. Examples of Wildcards

- 4.8. Licences
  - 4.8.1. Introduction
  - 4.8.2. How to See the Licences of a File?
  - 4.8.3. How to Change the Licences?
  - 4.8.4. Licence Configuration
  - 4.8.5. Licences for Directories
  - 4.8.6. The "Root" User
- 4.9. Filters
  - 4.9.1. Introduction
  - 4.9.2. Head
  - 4.9.3. Tail
  - 4.9.4. Sort
  - 4.9.5. nl
  - 4.9.6. wc
  - 4.9.7. cut
  - 4.9.8. sed
  - 4.9.9. uniq
  - 4.9.10. tac
  - 4.9.11. Other Filters
- 4.10. Grep and Common Expressions
  - 4.10.1. Introduction
  - 4.10.2. eGrep
  - 4.10.3. Common Expressions
  - 4.10.4. Some Examples
- 4.11. Pipelines and Redirection
  - 4.11.1. Introduction
  - 4.11.2. Redirect to a File
  - 4.11.3. Save a File
  - 4.11.4. Redirect From a File
  - 4.11.5. STDERR Redirection
  - 4.11.6. Pipelines
- 4.12. Managing Processes
  - 4.12.1. Introduction
  - 4.12.2. Active Processes
  - 4.12.3. Closing a Corrupt Program
  - 4.12.4. Foreground and Background Work

- 4.13. Bash
  - 4.13.1. Introduction
  - 4.13.2. Important Points
  - 4.13.3. Why ". /"?
  - 4.13.4. Variables
  - 4.13.5. The Declarations

## Module 5. Data analysis in *Big Data* projects: R programming language

- 5.1. Introduction to R programming language
  - 5.1.1. What is R?
  - 5.1.2. R Installation and the Graphic Interface of R
  - 5.1.3. Packages
    - 5.1.3.1. Standard Packages
    - 5.1.3.2. Contributed Packages and CRAN
- 5.2. Basic Features of R
  - 5.2.1. The Environment of R
  - 5.2.2. Software and Related Documentation
  - 5.2.3. R and Statistics
  - 5.2.4. R and the Window System
  - 5.2.5. Using R Interactively
  - 5.2.6. An Introductory Session
  - 5.2.7. Obtaining Help With Functions and Features
  - 5.2.8. R Commands, Cap Sensitivity, etc
  - 5.2.9. Recovery and Correction of Previous Commands
  - 5.2.10. Execute Commands or Diverting the Output to a File
  - 5.2.11. Data Storage and Object Deletion
- 5.3. Types of Objects in R
  - 5.3.1. Simple Manipulations; Numbers and Vectors
    - 5.3.1.1. Vectors and Their Assignment
    - 5.3.1.2. Vector Arithmetic
    - 5.3.1.3. Generating Regular Sequences
    - 5.3.1.4. Logical Vectors
    - 5.3.1.5. Lost Values
    - 5.3.1.6. Character Vectors
    - 5.3.1.7. Index Vectors
      - 5.3.1.7.1. Selecting and Modifying Subsets of a Dataset
    - 5.3.1.8. Other Types of Objects

- 5.3.2. Objects, Their Modes and Attributes
  - 5.3.2.1. Intrinsic Attributes: Mode and Length
  - 5.3.2.2. Changing the Length of an Object
  - 5.3.2.3. Obtaining and Configuring Attributes
  - 5.3.2.4. The Class of an Object
- 5.3.3. Sorted and Unsorted Factors
  - 5.3.3.1. A Specific Example
  - 5.3.3.2. The Tapply () Function and Unequal Matrices
  - 5.3.3.3. Sorted Factors
- 5.3.4. Matrices
  - 5.3.4.1. Matrices
  - 5.3.4.2. Matrix Indexation. The Subsections of a Matrix
  - 5.3.4.3. Index Matrices
  - 5.3.4.4. The Array () Function
  - 5.3.4.5. Mixed Arithmetic of Vectors and Matrices. The Recycling Rule
  - 5.3.4.6. The Outer Product of Two Matrices
  - 5.3.4.7. The General Transposition of a Matrix
  - 5.3.4.8. Matrix Multiplication
  - 5.3.4.9. Eigenvalues and Eigenvectors
  - 5.3.4.10. Decomposition of Singular Values and Determinants
  - 5.3.4.11. Forming Partitioned Matrices, Cbind () and Rbind ()
  - 5.3.4.12. The Concatenation Function, c (), With Matrices
- 5.3.5. Factor Frequency Tables
- 5.3.6. Lists
  - 5.3.6.1. Creating and Modifying Lists
  - 5.3.6.2. Concatenation Lists
- 5.3.7. DataFrames
  - 5.3.7.1. How to Create DataFrames?
  - 5.3.7.2. Attach () and Separate ()
  - 5.3.7.3. Working With DataFrames
- 5.4. Reading and Writing Data
  - 5.4.1. The Read.Table () Function
  - 5.4.2. The Scan () Function
  - 5.4.3. Access to the Sets of Incorporated Data
  - 5.4.4. Loading Data From Other R Packages
  - 5.4.5. Editing Data



- 5.5. Grouping, Loops and Conditional Execution
  - 5.5.1. Grouped Expressions
  - 5.5.2. Control Statements
    - 5.5.2.1. Conditional Execution: IF Sentences
    - 5.5.2.2. Repetitive Execution: For Loops, Repetition and Time
- 5.6. Writing Your Own Functions
  - 5.6.1. Simple Examples
  - 5.6.2. Defining New Binary Operators
  - 5.6.3. Arguments With Name and Default Value
  - 5.6.4. Argument "..."
  - 5.6.5. Assignments Within Functions

## Module 6. Graphical Environment in R

- 6.1. Graphical Procedures
  - 6.1.1. High-Level Plotting Commands
    - 6.1.1.1. The Plot () Function
    - 6.1.1.2. Multivariate Data Visualization
    - 6.1.1.3. Screen Graphics
    - 6.1.1.4. High-Level Plotting Arguments
  - 6.1.2. Low-Level Plotting Commands
    - 6.1.2.1. Mathematical Annotation
    - 6.1.2.2. Hershey Vectorial Sources
  - 6.1.3. Interacting With Graphics
  - 6.1.4. The Use of Graphic Parameters
    - 6.1.4.1. Permanent Changes: the Par () Function
    - 6.1.4.2. Temporary Changes: Arguments to Graphic Functions
  - 6.1.5. List of Graphic Parameters
    - 6.1.5.1. Graphical Elements
    - 6.1.5.2. Axles and Markings
    - 6.1.5.3. Figure Margins
    - 6.1.5.4. Multi-Figure Environment
  - 6.1.6. Descriptive Statistics: Graphical Representations

### Module 7. Statistical analysis in R

- 7.1. Discrete Probability Distributions
- 7.2. Continuous Probability Distributions
- 7.3. Introduction to Inference and Sampling (Point Estimate)
- 7.4. Confidence Intervals
- 7.5. Hypothesis Testing
- 7.6. ANOVA of a Factor
- 7.7. Adjustment kindness (Chi- Square Test)
- 7.8. Fitdist Package
- 7.9. Introduction to Multivariate Statistics

### Module 8. Machine Learning for Analysing Big Data

- 8.1. Introduction to Machine Learning
- 8.2. Presentation of the Problem, Loading Data and Libraries
- 8.3. Data Cleaning (Nas, Categories, Dummy Variables)
- 8.4. Exploratory Data Analysis (ggplot) + Crossed Validation
- 8.5. Prediction Algorithms: Multiple Linear Regression, Support Vector Machine, Regression Trees, Random Forest
- 8.6. Classification Algorithms: Logistic Regression, Support Vector Regression, Classification Trees, Random Forest...
- 8.7. Adjustment of the Hyper Parameters of the Algorithm
- 8.8. Predicting Data with Different Models
- 8.9. ROC Curves and Confusion Matrices for Assessing Model Quality

### Module 9. Data Mining Applied to Genomics

- 9.1. Introduction
- 9.2. Initiation to Variables
- 9.3. Text Cleaning and Conditioning
- 9.4. Generating the Word Matrix
  - 9.4.1. Creating the TDM Word Matrix
  - 9.4.2. Visualizations on the TDM Word Matrix
- 9.5. Description of the Word Matrix
  - 9.5.1. Graphic Representation of the Frequencies
  - 9.5.2. Creating a Word Cloud
- 9.6. Creating a Data Frame for K-NN
- 9.7. Creating a Classification Model
- 9.8. Validating a Classification Model
- 9.9. Guided Practical Exercise on Data Mining in Cancer Genomics

### Module 10. Techniques for extracting genomic data

- 10.1. Introduction to "Scraping Data"
- 10.2. Importing Spreadsheet Data Files Stored Online
- 10.3. Scraping HTML Text
- 10.4. Scraping Data from an HTML Table
- 10.5. Using APIs for Data Scraping
- 10.6. Extracting Relevant Information
- 10.7. Using the Rvest Package of R
- 10.8. Obtaining Data Distributed Over Multiple Pages
- 10.9. Extracting Genomic Data from the "My Cancer Genome" Platform
- 10.10. Extracting Information on Genes from the HGNC HUGO Gene Nomenclature Committee Database
- 10.11. Extracting Pharmacological Data from the "OncoKG" (Precision Oncology Knowledge Base) Database

### Module 11. New techniques in the age of genomics

- 11.1. Understanding the New Technology: Next Generation Sequence (NGS) in clinical practice
  - 11.1.1. Introduction
    - 11.1.1.1. Introduction
    - 11.1.1.2. Background
    - 11.1.1.3. Problems in the Application of Sanger Sequencing in Oncology
    - 11.1.1.4. New Sequencing Techniques
    - 11.1.1.5. Advantages of Using NGS in Clinical Practice
    - 11.1.1.6. Limitations of Using NGS in Clinical Practice
    - 11.1.1.7. Terms and Definitions of Interest
    - 11.1.1.8. Types of Studies Depending on Their Size and Depth
      - 11.1.1.8.1. Genome
      - 11.1.1.8.2. Exomes
      - 11.1.1.8.3. Multigenic Panels
    - 11.1.1.9. Stages of NGS Sequencing
      - 11.1.1.9.1. Preparing Samples and Libraries
      - 11.1.1.9.2. Preparing Templates and Sequencing
      - 11.1.1.9.3. Bioinformatic Processing
    - 11.1.1.10. Annotation and Classification of Variants
      - 11.1.1.10.1. Population Databases
      - 11.1.1.10.2. Locus-Specific Databases
      - 11.1.1.10.3. Bioinformatic Predictors of Functionality



- 11.2. DNA Sequencing and Bioinformatic Analysis
  - 11.2.1. Introduction
  - 11.2.2. Software
  - 11.2.3. Procedure
    - 11.2.3.1. Extracting Raw Sequences
    - 11.2.3.2. Aligning Sequences
    - 11.2.3.3. Alignment Refinement
    - 11.2.3.4. Variant Call
    - 11.2.3.5. Variant Filtering
- 11.3. RNA Sequencing and Bioinformatic Analysis
  - 11.3.1. Introduction
  - 11.3.2. Software
  - 11.3.3. Procedure
    - 11.3.3.1. QC Evaluation of Raw Data
    - 11.3.3.2. RNAr Filtering
    - 11.3.3.3. Filtered Quality Control Data
    - 11.3.3.4. Quality Trimming and Adapter Removal
    - 11.3.3.5. Alignment of Reads to a Reference
    - 11.3.3.6. Variant Call
    - 11.3.3.7. Differential Gene Expression Analysis
- 11.4. ChIP-seq Technology
  - 11.4.1. Introduction
  - 11.4.2. Software
  - 11.4.3. Procedure
    - 11.4.3.1. CHIP-seq Data Set Description
    - 11.4.3.2. Obtaining Information About the Experiment Using the GEO and SRA Websites
    - 11.4.3.3. Quality Control of the Sequencing Data
    - 11.4.3.4. Trimming and Filtering Reads
    - 11.4.3.5. Visualizing Results with the Integrated Genome Browser (IGV)
- 11.5. *Big Data* Applied to Oncology Genomics
  - 11.5.1. The Process of Analysis Data
- 11.6. Genomic Servers and Databases of Genetic Variants
  - 11.6.1. Introduction
  - 11.6.2. Online Genomic Servers
  - 11.6.3. Genomic Server Architecture
  - 11.6.4. Recuperation and Data Analysis
  - 11.6.5. Personalization

- 11.7. Annotation of Genetic Variants
  - 11.7.1. Introduction
  - 11.7.2. What is Variant Calling?
  - 11.7.3. Understanding the VCF Format
  - 11.7.4. Variant Identification
  - 11.7.5. Variant Analysis
  - 11.7.6. Predicting the Effect of the Variation of a Protein's Structure and Function

## Module 12. Application of bioinformatics in genomic oncology

- 12.1. Clinical and Pharmacological Enrichment of Gene Variants
- 12.2. Mass Search in PubMed for Genomic Information
- 12.3. Mass Search in DGIdb for Genomic Information
- 12.4. Mass Search in Clinical Trials for Clinical Trials on Genomic Data
- 12.5. Gene Similarity Search for the Interpretation of a Gene Panel or Exome
- 12.6. Mass Search for Genes Connected to a Disease
- 12.7. Enrich-Gen: Platform for the Clinical and Pharmacological Enrichment of Genes
- 12.8. Procedure to Produce a Genomic Report in the Age of Precision Oncology

## Module 13. Breast Cancer

- 13.1. Principles of Breast Cancer
  - 13.1.1. Epidemiology
  - 13.1.2. Risk Factors
- 13.2. Screening
- 13.3. Diagnosis
  - 13.3.1. Clinical Introduction and Diagnosis
- 13.4. Staging
- 13.5. Subtypes
- 13.6. Treatment of Luminal Disease
  - 13.6.1. Localized Disease
  - 13.6.2. Advanced Disease
- 13.7. Treatment of HER 2 Disease
  - 13.7.1. Localized Disease
  - 13.7.2. Advanced Disease
- 13.8. Treatment of Triple Negative Disease
  - 13.8.1. Localized Disease
  - 13.8.2. Advanced Disease
- 13.9. Future Prospects for Luminal Disease
- 13.10. Future Prospects for Non-Luminal Disease

## Module 14. Lung Cancer

- 14.1. Principles of Lung Cancer
  - 14.1.1. Epidemiology
  - 14.1.2. Risk Factors
- 14.2. Major Mutations: Potential Targets
- 14.3. Diagnosis
- 14.4. Staging
- 14.5. Treatment of Microcytic Cancer with Localized Disease
- 14.6. Treatment of Microcytic Cancer with Widespread Disease
- 14.7. Treatment of non-small Cell Lung Cancer Localized Disease
- 14.8. Treatment of non-small Cell Lung Cancer Advanced Disease
  - 14.8.1. Adenocarcinoma
  - 14.8.2. Squamous cell carcinoma
- 14.9. Future Perspectives
- 14.10. Primary prevention

## Module 15. ORL tumours

- 15.1. ORL Cancer
  - 15.1.1. Epidemiology
  - 15.1.2. Risk Factors
- 15.2. Major Mutations: Potential Targets
- 15.3. Diagnosis
- 15.4. Staging
- 15.5. Treatment of Localized Laryngeal Tumors
- 15.6. Treatment of Pharynx Tumors
- 15.7. Treatment of Advanced ORL Tumors
- 15.8. Treatment of Localized Cavum Tumors
- 15.9. Treatment of Advanced Cavum Tumors
- 15.10. Future Perspectives

## Module 16. Colorectal cancer and anal canal

- 16.1. Colon and anal canal
  - 16.1.1. Epidemiology
  - 16.1.2. Risk Factors
- 16.2. Diagnosis
- 16.3. Staging
- 16.4. Treatment of Localized Disease Colon Cancer
- 16.5. Treatment of Localized Rectal Cancer
- 16.6. Treatment of Advanced Disease Colorectal Cancer
- 16.7. Treatment of Anal Canal Tumors
- 16.8. Future Perspectives
- 16.9. Screening
- 16.10. Genetic Associate Syndromes

## Module 17. Non-colorectal digestive tumors

- 17.1. Non-colorectal digestive tumors
  - 17.1.1. Epidemiology
  - 17.1.2. Risk Factors
- 17.2. Diagnosis
- 17.3. Staging
  - 17.3.1. Oesophageal Cancer
  - 17.3.2. Stomach Cancer
  - 17.3.3. Pancreatic Cancer
- 17.4. Oesophageal Cancer
  - 17.4.1. Localized Disease Treatment
  - 17.4.2. Treatment of Extended Disease
- 17.5. Stomach Cancer
  - 17.5.1. Localized Disease Treatment
  - 17.5.2. Treatment of Extended Disease
- 17.6. Pancreatic Cancer
  - 17.6.1. Localized Disease Treatment
  - 17.6.2. Treatment of Extended Disease
- 17.7. Biliary Tract Cancer
- 17.8. Hepatocellular Carcinoma
- 17.9. Neuroendocrine Tumors
- 17.10. Future Perspectives

**Module 18. Gynecologic Tumors**

- 18.1. Gynecologic Tumors
  - 18.1.1. Epidemiology
  - 18.1.2. Risk Factors
- 18.2. Diagnosis
- 18.3. Staging
  - 18.3.1. Ovarian Cancer
  - 18.3.2. Cervical Cancer
  - 18.3.3. Endometrial Cancer
- 18.4. Treatment of Localized Ovarian Cancer
- 18.5. Advanced Ovarian Cancer Treatment
- 18.6. Localized Uterine Cancer Treatment
  - 18.6.1. Cervix
  - 18.6.2. Endometrium
- 18.7. Advanced Uterus Cancer Treatment
  - 18.7.1. Cervix
  - 18.7.2. Endometrium
- 18.8. Uterine Sarcomas
- 18.9. Genetic Syndromes
- 18.10. Future Perspectives

**Module 19. Urological tumors**

- 19.1. Evolution
  - 19.1.1. Epidemiology
- 19.2. Diagnosis
  - 19.2.1. Prostate Cancer
  - 19.2.2. Urothelial Cancer
  - 19.2.3. Renal Cancer
  - 19.2.4. Testicular Cancer
- 19.3. Staging
  - 19.3.1. Prostate Cancer
  - 19.3.2. Urothelial Cancer
  - 19.3.3. Renal Cancer

- 19.4. Localized Prostate Cancer Treatment
- 19.5. Advanced Prostate Cancer Treatment
- 19.6. Localized Urothelial Cancer Treatment
- 19.7. Advanced Urothelial Cancer Treatment
- 19.8. Renal Cancer Treatment
- 19.9. Testicular Cancer Treatment
- 19.10. Penile Cancer

**Module 20. Sarcomas and melanomas**

- 20.1. Principles of Mesenchymal Tumors
- 20.2. Diagnosis of Mesenchymal Tumors
- 20.3. Surgical Treatment of Bone and Soft Tissue Tumors
- 20.4. Sarcoma Medical Treatment
  - 20.4.1. Bones
  - 20.4.2. Soft Parts
- 20.5. Treatment of GIST
- 20.6. Melanoma
- 20.7. Diagnosis and Staging Melanoma
- 20.8. Localized Melanoma Treatment
- 20.9. Advanced Melanoma Treatment
- 20.10. Future Perspectives
  - 20.10.1. Bone and Soft Tissue Tumors
  - 20.10.2. Melanoma

**Module 21. Brain Tumors**

- 21.1. Evolution
  - 21.1.1. Epidemiology
- 21.2. Classification
- 21.3. Genetic Associate Syndromes
- 21.4. Prognostic and Predictive Response Factors
- 21.5. Diagnosis
- 21.6. Treatment of Low Grade Tumors
- 21.7. Treatment of High Grade Tumors
- 21.8. Immunotherapy
- 21.9. Cerebral Metastases
- 21.10. Future Perspectives

## Module 22. Radiotherapy

- 22.1. Evolution
- 22.2. Types of Radiotherapy
- 22.3. Treatment of Breast Cancer
- 22.4. Treatment of Lung Cancer
- 22.5. Treatment of Prostate Cancer
- 22.6. Treatment of Digestive Tumors
- 22.7. Treatment of Brain Tumors
- 22.8. Treatment of ORL Tumors
- 22.9. Orbital Tumors, Mediastinal Tumors, Mesenchymal Tumors
- 22.10. Palliative Radiotherapy

## Module 23. Characterization and Fields of Application of Psycho-Oncology

- 23.1. Cancer and Its Impact on Current Society
  - 23.1.1. Cultural Variability
  - 23.1.2. Incidence, Prevalence and Mortality
- 23.2. Myths, Beliefs and Pseudotherapies Related to Cancer
- 23.3. Medical Care for Cancer Patients
  - 23.3.1. Early Detection of Cancer
  - 23.3.2. Surgery and Treatment
- 23.4. Risk Factors and Cancer
  - 23.4.1. Psychoneuroimmunology
  - 23.4.2. Stress, Coping Styles and Personality Variables
- 23.5. Cancer Prevention
  - 23.5.1. Primary and Secondary Prevention
  - 23.5.2. Health Education and Healthy Lifestyle Habits
- 23.6. Functions of the Psycho-Oncologist: Their Role Within the Hospital Environment
- 23.7. Teaching, Training, Specialization and Accreditation in Psycho-Oncology
- 23.8. Objectives and Areas of Psychological Intervention for Cancer Patients and their Families
- 23.9. Other Disciplines Related to Psycho-Oncology
  - 23.9.1. Psychology as an Intersection Between Oncology and Health Psychology
- 23.10. Approach to the Social Needs of the Cancer Patient
  - 23.10.1. Economic and Occupational Impact. Job Reintegration
  - 23.10.2. Social Support and Cancer



**Module 24. Psychological Treatments in Cancer and Third Generation Therapies**

- 24.1. Effective Psychological Treatments in Psycho-Oncology
- 24.2. Cognitive-Behavioral Therapy in Cancer Treatment
  - 24.2.1. Identification of Automatic Thoughts and Modification of Cognitions
  - 24.2.2. Activation Control Techniques
    - 24.2.2.1. Diaphragmatic Breathing Training
    - 24.2.2.2. Progressive Muscular Relaxation
  - 24.2.3. Behavioral Activation
  - 24.2.4. Exposition Techniques and Guided Imagination
- 24.3. Cognitive Training Program
- 24.4. Rehabilitation Program Based on Physical Exercise
- 24.5. Mindfulness
  - 24.5.1. Mindfulness Training Program
  - 24.5.2. Compassion and Self-Compassion Practice
- 24.6. Acceptance and Commitment Therapy (ACT)
  - 24.6.1. Components of ACT and Clinical Methods
- 24.7. Therapy Focused on the Search for Meaning
  - 24.7.1. Cancer and Feeling. Exploration of the Sources of Meaning
- 24.8. Dignity Therapy
  - 24.8.1. The Concept of Dignity in Cancer Patients
  - 24.8.2. Models of Dignity. Chochinov
- 24.9. Systemic Family Therapy
  - 24.9.1. Family and Cancer. Most Common Family Dynamics
- 24.10. Pseudotherapies and Pseudosciences Against Cancer
  - 24.10.1. Positions of Government Agencies
  - 24.10.2. Pseudotherapies and Pseudosciences With and Without Scientific Evidence

**Module 25. Most Relevant Psychological Aspects According to Different Tumor Locations**

- 25.1. Leukemias, Lymphomas and Myelomas
  - 25.1.1. Bone Marrow Transplantation and Isolation Situations
- 25.2. Breast Cancer and Gynecology
  - 25.2.1. Body image
  - 25.2.2. Sexuality
  - 25.2.3. Self-esteem
  - 25.2.4. Chemobrain Effect
- 25.3. Prostate Cancer
  - 25.3.1. Incontinence and Sexual Impotence
- 25.4. Colon Cancer and the Digestive System
  - 25.4.1. Living with a Colostomy
- 25.5. Intervention in Laryngectomized Patients
  - 25.5.1. Speech Therapy Intervention
  - 25.5.2. Alteration in Social and Work Life
- 25.6. Head and Neck Tumors
- 25.7. Thyroid Cancer
- 25.8. Tumors of the Central Nervous System
  - 25.8.1. Cognitive Deficits and Mobility Limitations
- 25.9. Lung Cancer
- 25.10. Child Cancer
  - 25.10.1. Emotional Development and Child Intellect
  - 25.10.2. Social Impact on the Child
  - 25.10.3. Impact on the Family

## Module 26. Protocols for Emotional Intervention at the End of Life

- 26.1. Palliative Care Objectives
- 26.2. Evaluation of Suffering
- 26.3. Process of Psychosocial Adaptation at the End of Life
  - 26.3.1. Adaptive vs. Maladaptive Reactions
- 26.4. Triadic Interaction Model for Patients, Family and Healthcare Professionals
- 26.5. Specific Interventions Centered on the Patient
  - 26.5.1. Anxiety
  - 26.5.2. Sadness
  - 26.5.3. Hostility
  - 26.5.4. Fear
  - 26.5.5. Blame
  - 26.5.6. Denial
  - 26.5.7. Withdrawal
- 26.6. Specific Needs of the Family. Assessment of the Patient-Family Unit
  - 26.6.1. Conspiracy of Silence
  - 26.6.2. Family Claudication
- 26.7. Interventions Oriented Towards Health Professionals
  - 26.7.1. Working in Multicultural Teams
  - 26.7.2. Prevention of Burnout Syndrome
- 26.8. Attention to the Spiritual Needs of the Patient
  - 26.8.1. Spiritual Care Model of SECPAL (Spanish Society of Palliative Care)
  - 26.8.2. Existential Angst and Religious Experience
- 26.9. Psychological Intervention in Pediatric Palliative Care
- 26.10. Advance Decision Making Process and Planning (ADP)
  - 26.10.1. Declaration and Registry of Advance Vital Wills

## Module 27. Evaluation and Measurement Instruments

- 27.1. The Psycho-Oncology Clinical Interview
- 27.2. Evaluation of the Needs of the Cancer Patient
  - 27.2.1. Needs Evaluation Questionnaire, (NEQ)
  - 27.2.2. Patient Needs Assessment Tool, (PNAT)
  - 27.2.3. The Short-Form Cancer Needs Questionnaire, (CNQ)
- 27.3. Evaluation of the Quality of Life of the Cancer Patient
  - 27.3.1. EORTC Questionnaire (European Organization for Research and Therapy of Cancer)
  - 27.3.2. FACT Questionnaire (Functional Assessment of Cancer Therapy)
  - 27.3.3. SF 36 Health Questionnaire
- 27.4. Main Evaluation Questions for Physical Symptoms of Cancer
  - 27.4.1. Edmonton Symptom Assessment System (ESAS)
  - 27.4.2. Questions for Pain Assessment
  - 27.4.3. Questions for Fatigue and Quality of Sleep Evaluation
  - 27.4.4. Cognitive Screening and Functional State Questionnaires
  - 27.4.5. Questionnaires for the Evaluation of Sexuality
- 27.5. Detection of Distress and Assessment of Suffering
  - 27.5.1. Emotional Distress Screening Questionnaire
  - 27.5.2. Emotional Distress Thermometer
  - 27.5.3. Hospital Anxiety and Depression Scale (HAD)
  - 27.5.4. Subjective Perception of the Passing of Time
    - 27.5.4.1. Waiting Times in Oncology
- 27.6. Socio-Familial Assessment and Valuation
  - 27.6.1. Perception of the Family Function. APGAR Family Questionnaire
  - 27.6.2. Family Relationship Index (FRI)
  - 27.6.3. Self Report Family Inventory (SFI)
- 27.7. Coping Assessment Questionnaires for Cancer Patients
  - 27.7.1. Mental Adjustment to Cancer (MAC)
  - 27.7.2. Questionnaire to Measure Coping Styles. Miller Behavioral Style Scale (MBSS)
  - 27.7.3. COPE Questionnaire
- 27.8. Assessment Tools for Spiritual Needs
  - 27.8.1. Spiritual Needs and Well-Being Assessment Scale from GES (Spiritual Group). Part of SEPCAL (Spanish Society for Palliative Care)
  - 27.8.2. Functional Assessment of Chronic Illness Therapy Spiritual Well Being
  - 27.8.3. The Patient Dignity Inventory
- 27.9. Self-Report and Observation
  - 27.9.1. Clinical Case Formulation
- 27.10. Psychological Assessment of Children in Palliative Care

**Module 28. Communication with the Oncologic Patient**

- 28.1. Illness, Communication and the Helping Relationship
  - 28.1.1. Doctor-Patient Communication as a Possible Factor of Improvement and Iatrogenesis. Pain and Suffering Prevention
  - 28.1.2. Communication Barriers
- 28.2. How to Give Bad News About Cancer
  - 28.2.1. Answers to Difficult Questions
  - 28.2.2. Communication in Complicated Situations
- 28.3. Counselling Techniques in Clinical Practice
  - 28.3.1. Counselling Attitudes
  - 28.3.2. Assertive Communication
  - 28.3.3. Emotional Control
  - 28.3.4. Problem-Solving and Responsible Decision-Making
- 28.4. Relationship Models and Therapeutic Influence
  - 28.4.1. Paternal Model
  - 28.4.2. Informative Model
  - 28.4.3. Interpretive Model
  - 28.4.4. Deliberative Model
- 28.5. Tools for Emotional Support in Cancer
  - 28.5.1. How to Speak With a Cancer Patient. Guide for Friends and Family
  - 28.5.2. Levels of Emotional Interaction
- 28.6. Non-Verbal Communication in the Support Relationship
- 28.7. Communication in Palliative and End-of-Life Care
  - 28.7.1. Learning to Talk About Death
- 28.8. Talking About Cancer With Children
- 28.9. Communication in People With Communication Deficits
- 28.10. Treatment of Cancer in the Media
  - 28.10.1. Cancer on Social Networks

**Module 29. Grief Management**

- 29.1. Death, Culture and Society
  - 29.1.1. Health Professionals in the Face of Death
- 29.2. Psychological Evaluation of Grief
  - 29.2.1. Interview and Specific Instruments for Assessment
- 29.3. Common Reactions to Grief
  - 29.3.1. Normal Grief and Complicated Grief
  - 29.3.2. Vulnerability Factors
  - 29.3.3. Differential Diagnosis Between Grief and Depression
- 29.4. Main Theoretical Models About Grief
  - 29.4.1. Bowlby's Attachment Theory
  - 29.4.2. Nuclear Beliefs and Meaning Reconstruction
  - 29.4.3. Conceptual Models About the Trauma
- 29.5. Objectives of Intervention in Grief and Recommended Interventions
  - 29.5.1. Facilitating the Normal Process of Grief. Prevention of Complicated Grief
  - 29.5.2. Suggestions for Intervention Before and After the Death
  - 29.5.3. Bereavement Psychotherapy from an Integrative Relational Model
- 29.6. Group Intervention in Attention to Grief
  - 29.6.1. Psychological Intervention Grief Due to the Loss of a Child
- 29.7. Stages of Grief
  - 29.7.1. Bereavement Tasks
- 29.8. Grief in Children
- 29.9. Suicide and Cancer
- 29.10. Psychopharmacology in Attention to Grief

### Module 30. Other Psychological Interventions in Specific Cancer-Related Areas

- 30.1. Psychological Treatment to Give Up Smoking
  - 30.1.1. Myths About Tobacco
  - 30.1.2. Analysis of Smoking Behavior. Physical and Psychological Dependence
  - 30.1.3. Program Structure. Sessions and Methodology
  - 30.1.4. Abstinence and Prevention of Relapse
- 30.2. Early Detection of Cancer
  - 30.2.1. Screening Tests (Mammography, FOBT, Cytology, etc.)
  - 30.2.2. Anticipatory Anxiety and Difficulties in Participation
  - 30.2.3. Oncologic Genetic Counseling
- 30.3. Mutual of Self-Help Groups
- 30.4. Psycho-Educational Groups for Family Members and Patients
  - 30.4.1. Topics to Approach and Work Methodology
  - 30.4.2. Inclusion and Exclusion Criteria
- 30.5. Psychological Intervention in Cancer Survivors. The Return to "Normality"
- 30.6. Control of Secondary Effects in Cancer Patients
  - 30.6.1. Pain control
  - 30.6.2. Against Fatigue and Sleep
  - 30.6.3. Sexuality Control
  - 30.6.4. Cognitive Alterations. Chemobrain Effect
- 30.7. Preparation and Intervention for Hospitalization and Surgery
- 30.8. Psychological Preparation for Other Medical Treatment (Chemotherapy, Radiotherapy, etc.)
- 30.9. Psychological Intervention in Bone Marrow Transplants (BMT)
- 30.10. Strategies for Training Volunteers in Cancer Patient Care
  - 30.10.1. The Volunteer Interview. Assignment and Matching of the Volunteer to Each Profile
  - 30.10.2. Specific Education of the Volunteer. Tutoring and Monitoring

### Module 31. Research in Cancer

- 31.1. World Declaration for Cancer Research
- 31.2. Methodology of Cancer Research
  - 31.2.1. Cancer Prevention Area
  - 31.2.2. Cancer Treatment Area
- 31.3. Common Errors in Psych-Oncology Research
- 31.4. Steps to Follow to Carry Out Psycho-Oncology Research
- 31.5. Epidemiological Research Into Cancer
- 31.6. Biomedical Research
  - 31.6.1. Participation in Clinical Trials in Cancer
  - 31.6.2. Doubts, Risks and Benefits
  - 31.6.3. Distribution of Clinical Trials Per Type of Cancer
- 31.7. Main Advances in Research
  - 31.7.1. Priority Areas of Research in Psycho-Oncology
  - 31.7.2. Priority Areas of Research in Palliative Care
  - 31.7.3. New Lines of Research
- 31.8. Lines of Research from Social Work
- 31.9. Publications on Psycho-Oncology and Palliative Care in Scientific Journals
  - 31.9.1. Writing of Scientific Articles

### Module 32. Ethical Aspects in Psycho-Oncology and Psychology of Palliative Care

- 32.1. Telling the Patient the Truth or Not. Managing the Bearable Truth
- 32.2. Cancer and Ethics: A Complex Interaction
  - 32.2.1. Principled Bioethics
  - 32.2.2. Personalistic Bioethics
  - 32.2.3. Double Effect Principle
- 32.3. Anthropological Basis
  - 32.3.1. The Experience of Fragility
  - 32.3.2. The Experience of Suffering
  - 32.3.3. The Person as Wounded Healer
- 32.4. Rights of the Cancer Patient
  - 32.4.1. Patient Autonomy Law
  - 32.4.2. Informed consent
  - 32.4.3. GDPR and Confidentiality of Medical History



- 32.5. Ethical Duties of Health Care Workers Caring for Cancer Patients
- 32.6. Death with Dignity
  - 32.6.1. Assisted Suicide and Euthanasia
  - 32.6.2. Adequacy or Limitation of Treatment, Refusal of Treatment, Sedation, Therapeutic Obstinacy
- 32.7. Participation of the Patient in Their Process of Illness, Treatment and Decision Making
  - 32.7.1. Moral Dialogue
- 32.8. Humanization in the Care of Cancer Patients
  - 32.8.1. Quality and Warmth
- 32.9. Ethical Care Committees and Clinical Research
- 32.10. Inequalities and Cancer Equity
  - 32.10.1. Current Situation in Palliative Care

“*The program offers a selection of complementary readings, including scientific articles, reviews and clinical guidelines, which complement and expand the theoretical contents of the program*”



06

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.



“

*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## At TECH we use the Case Method

What should a professional do in a given situation? Throughout the program, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

*With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.*



According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, trying to recreate the real conditions in the physician's professional practice.

“

*Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method”*

The effectiveness of the method is justified by four fundamental achievements:

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



## Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.

*Professionals will learn through real cases and by resolving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.*



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology, more than 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

*Relearning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.*

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.



This program offers the best educational material, prepared with professionals in mind:



#### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



#### Surgical Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current medical techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.



#### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



#### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.







#### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



#### Classes

There is scientific evidence on the usefulness of learning by observing experts. The system known as Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



#### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.



# 07 Certificate

The Advanced Master's Degree in Comprehensive Medical Oncology guarantees students, in addition to the most rigorous and up-to-date education, access to an Advanced Master's Degree issued by TECH Technological University.



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*Successfully complete this program  
and receive your university qualification  
without having to travel or fill out  
laborious paperwork”*

This **Advanced Master's Degree in Comprehensive Medical Oncology** contains the most complete and up-to-date scientific on the market.

After the student has passed the assessments, they will receive their corresponding **Advanced Master's Degree** diploma issued by **TECH Technological University** via tracked delivery\*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Advanced Master's Degree, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Advanced Master's Degree in Comprehensive Medical oncology**

Official No. of Hours: **3,000 h.**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
development language  
virtual classroom



## Advanced Master's Degree

Comprehensive  
Medical Oncology

- » Modality: online
- » Duration: 2 years
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

# Advanced Master's Degree Comprehensive Medical Oncology

