PROPOSTA DI CORSO INTERNO per l'A.A. 2025-2026

TIPOLOGIA DI CORSO: CORSO SPECIALISTICO (destinatari: allievi/e III, IV, V e VI anno)

Ambito: Scienze della vita (Classe delle Scienze Sperimentali)

Cognome e nome proponente/coordinatore	**SSD e Dipartimento di afferenza**	**Indirizzo email**	**Recapito telefonico**
Pulvirenti Alfredo	INFO-01/A, MEDCLIN e DMI	alfredo.pulvirenti@unict.it	3471410591

Titolo del Corso in Italiano: **Le cellule staminali come strumento per guarire e studiare il cervello**

Titolo del Corso in Inglese: **Stem cells as tools for understanding and repairing the brain**

SETTORE/I SCIENTIFICO-DISCIPLINARE/I DI RIFERIMENTO DEL CORSO: BIO/13

STRUTTURA DEL CORSO

Durata: 36 ore oltre verifica finale apprendimento

Numero di CFU (Crediti Formativi Universitari) del Corso unitario: 6 (6 ore per CFU)

Corso suddiviso in moduli formativi: Sì

Modulo: 1
Titolo: **Introduction to Stem Cells and Organoids**
Durata in ore: **6**
SSD: BIO/11
Testi consigliati:
Calendario di massima: Primo semestre 2025/26
Docente: **Pulvirenti Alfredo**
Cittadinanza:
Istituzione di afferenza: UNICT
Ruolo: Professore ordinario
E-mail: alfredo.pulvirenti@unict.it
Tel. Cellulare: 3471410591
Link a pagina web istituzionale:
Breve Bio: I got my Laurea degree (summa cum laude, 1999), my PhD (2003), and my post-doc (2004) in Computer Science from the University of Catania. From 2005 to 2014, I've been Assistant

Professor at the University of Catania. From Decembre 2014/september 2023, associate professor of Computer Science at University of Catania. From October 2023 is full professor of Computer Science at University of Catania. My research interests mainly focuses on bioinformatics and biomedicine. In particular, I study of the phenomenon of RNA interference (microRNAs and long non-coding RNAs), through stochastic and network based inference methods; the sub-graph matching and motif finding, also approximated, with applications to biological networks; the multiple network alignment through Monte Carlo Methods; the development of robust methods for the pathway-based analysis of RNA-seq data. I also collaborate with the Istituto Nazionale di Geofisica e Vulcanologia (INGV, sezione di Catania) for the analysis of temporal time series of seismic and infrasonic signals. I have served as PC member of many International Conferences. I have been guest editor on BMC Bioinformatics, Briefings in Bioinformatics and Information Systems Elsevier. I also spent several periods of research at Courant Institute of Mathematical Science, NYU (NY), and at the Department of Molecular Virology, Immunology and Medical Genetics of the Comprehensive Cancer Center at The Ohio State University Wexner Medical Center (OH).

Modulo: 2

Titolo: **Stem Cells and the brain**

Durata in ore: **15**

SSD: BIO/13

Testi consigliati:

Calendario di massima: Spring 2026

Docente: **Götz Magdalena**

Cittadinanza:

Istituzione di afferenza: LMU

Ruolo: Professor

E-mail: magdalena.goetz@lrz.uni-muenchen.de

Tel. Cellulare: +49 89 2180 75252

Link a pagina web istituzionale: https://www.helmholtz-munich.de/en/isf/pi/magdalena-goetz

Breve Bio: Magdalena Götz studied biology at Tübingen and Zürich and fell in love with developmental biology during that time already. She performed her doctoral thesis on identifying mechanisms how neurons find their targets in the developing brain and proceeded in her postdoc work on mechanisms of brain regionalization and fate specification, using the state-of-the art viral vector tools developed at that time. When she became a group leader at the Max-Planck Institute of Neurobiology she was the first to utilize fluorescent-activated cell sorting to identify progenitor subtypes which led to the discovery of radial glial cells as the actual neural stem cells (Malatesta et al., 2000). This led her to probe the - at that time prior to the invention of induced pluripotent stem cells - crazy idea of turning differentiated glia into neurons, i.e. the invention of direct neuronal reprogramming (Heins et al., 2002). Since then, in her tenured positions at Helmholtz Munich and LMU, she developed this approach further by improving reprogramming to the amazing efficiency of up to 90% even in vivo after brain injury targeting selectively reactive, proliferating glia (Gascon et al., 2016), establishing this approach also for cells isolated from adult human brains (Karow et al., 2012), and establishing many fundamental principles and mechanisms during this process, such as the key influence of the starter cells (Kempf et al., 2021) and the crucial contribution of the mitochondrial proteome (Russo et al., 2021). Importantly, Magdalena Götz never left her core expertise – exploring mechanisms of brain development – that she could then also use for

reprogramming. She discovered a novel nuclear protein that acts like a master regulator of phase transition in the nucleus coregulating several compartments (Esgleas et al., 2020) as the first factor to regulate brain folding even in the normally smooth murine brain (Stahl et al., 2013). In her recent work she serendipitously identified the amazingly specific regulation of a novel interphase centrosome protein, Akna, in only subsets of neural stem cells (Camargo et al., 2019) and took these to explore the comprehensive proteome of human neural stem cells and neurons that she showed to differ from other cells by more than half of their entire proteome (O'Neill et al. 2022). This basic research allowed her to understand how mutation of a ubiquitous protein can actually result in brain disease – namely due to its centrosome localization only in neural cells.

Modulo: 3
Titolo: **Brain Repair**
Durata in ore: **15**
SSD: BIO/13
Testi consigliati:
Calendario di massima: Spring 2026
Docente: **Puglisi Matteo**
Cittadinanza:
Istituzione di afferenza: LMU
Ruolo: PhD student
E-mail: matteo.puglisi@bmc.med.lmu.de
Tel. Cellulare: /
Link a pagina web istituzionale:
Breve Bio: Matteo Puglisi is a Ph.D. student in the lab of Prof. Magdalena Götz, affiliated with both Ludwig-Maximilians-Universität München and Helmholtz Zentrum München. He completed his early education in his hometown of Catania, Italy, before enrolling at the University of Milan, where he earned a Bachelor's degree in Medical Biotechnology in 2014 and a Master's degree in Molecular Biology of the Cell in 2017. During his academic training, Matteo developed a strong interest in neuroscience, which led him to write an experimental thesis in neuroepigenetics under the supervision of Prof. Elena Battaglioli for his Bachelor's and a second one on Huntington's disease in the lab of Prof. Elena Cattaneo for his Master. Following his graduation, he worked as a research assistant in the Laboratory of Molecular Neurobiology led by Prof. Dario Bonanomi at the San Raffaele Scientific Institute in Milan. Matteo's growing passion for neuroscience and academic research led him to join the lab of Prof. Magdalena Götz in Munich in 2018. His current research focuses on brain injury and neuronal replacement through astrocyte reprogramming, supported by international funding programs including a Marie Skłodowska-Curie Fellowship (NanoStem ITN) and the NFRF-funded project iNeurons.

Struttura del Corso

Lingua/e dell'insegnamento: Inglese

Eventuali prerequisiti degli/lle allievi/e frequentanti: Massimo 4 studenti Tutti al VI anno di Medicina e Chirurgia

Obiettivi formativi: The handling of stem cell models such as iPSCs and organoids as an important tool to study brain development

Contenuti del Corso The module "Stem Cells and the brain" will introduce topics connected to different flavours of stem cells in the neuroscience field, such as embryonic and adult stem cells. The module "Brain Repair" will dig deeper into the topic of brain repair and on how stem cells systems can be used to model diseases or directly used as therapeutics. The practical part of this module will involve again brain organoids, but also astrocytes reprogramming

Metodologia didattica: Oral lessons, practical laboratories

Modalità della verifica finale di apprendimento: Final report

Calendario programmato: II Semestre (da marzo/aprile a settembre 2026)