

# SUIT UP YOUR SCIENCE!

A COURSE ON GRAPHIC DESIGN FOR RESEARCHERS

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## COURSE PROGRAM

### SESSION n.1

We will define and talk about the process of planning and designing our graphics: the very important steps that go before we sit down to actually make figures.

1. **What is design and how can it help researchers?** We will briefly explore the reasons why design is beneficial and worth implementing in scientific communication.
2. **The process of design.** When we make graphics and put together figures, we need to have a clear idea of what we are trying to say and to whom we want to say it. Here, and during the rest of this session, we will explain which are each of the steps of the process to plan our graphics.
3. **Understanding your audience.** In this first step of the design process, we will see how the audience is the first and most important step of every type of communication. We will respond three key questions to properly frame our message for our intended audience.
4. **The different levels of depth in communication.** We will learn an easy and simple system to determine the type of audience we are dealing with.
5. **Defining your message.** We will learn a few basic principles to construct a coherent and appealing message. We will learn what is a narrative structure and how to express our message in this way so that it is clear, interesting and engaging.

### SESSION n.2

In this session we will learn how to use specialized software tools to create all types of graphics. We will start by learning a recommended workflow to input charts and be able to manipulate them with design software.

*IMPORTANT: Learning will not be tied to one specific software; all the concepts and functions taught will apply to any software that students choose, and will be practiced during the course as we learn them. I have experience with, and will recommend, the following applications (which should provide a good array of options for students): \_Adobe Illustrator, Affinity Designer and Inkscape.\_*

1. **Why use vector graphics software?** We will briefly mention why this type of software is the right tool to create our figures and other presentations.

2. **Vector graphics versus bitmaps.** We will explain this simple but fundamental question that will enable students a higher degree of understanding and control when producing graphics for print or publication.
3. **Recommended workflow.** We will explain the different steps to take from raw data to creating figures with them, giving examples of tools that can be used.
4. **Recommended software.** We will comment the advantages and disadvantages of three different tools to create graphics, so that the students know which option is more interesting for them.
5. **Creating a file.** To begin to create graphics, we will make a new "canvas" and learn what are the important features of it that we need to determine, including working with real sizes and color profiles.
6. **Fundamentals of the interface.** We will take a look at the general organization of the software interface and its tools.
7. **Selection, alignment and grouping.** These are the most basic and fundamental functions of any software, and they allow to manipulate imported graphics and create compositions. We will learn to use them.
8. **Exporting our graphics.** Understanding this step will allow students to produce their figures in any necessary format with different specifications, which is a crucial ability when working with journals or print shops. We will talk about formats and resolutions.

## SESSION n.3

We will continue the work started in the previous session, learning to use more advanced functions of specialized software tools.

1. **Pen tool.** This powerful and versatile tool, present in all software, allows to draw, but also so create illustrations from images, and even to cut images in desired shapes. It is a very useful tool to create diagrams and easily add illustrations to scientific content, and we will learn to use it step by step.
2. **Node selection.** The shapes and illustrations created with the pen tool can be further arranged and manipulated by "deforming" their shapes. This provides an excellent degree of control, especially useful for beginner illustrators, as well as having other useful applications to manipulate existing graphics and charts. We will explain this tool and learn to use it.
3. **Text.** Text is a fundamental part of any design, and we will learn to include and manipulate texts in our graphics.
4. **Managing color.** Color is an important feature when designing and there are ways to give professionalism to our graphics while saving ourselves time and effort. We will learn the available ways to do this, and explain the utility of consistently using color palettes.
5. **Arrangement and layers.** We will learn how to use these two functions to be able to create and control more complex compositions. This is useful to make our job easier and save ourselves time, especially when creating big figures or posters.

# SESSION n.4

In this session we will learn the fundamentals of visual communication and graphic design theory, and how to apply them to create clear, functional and aesthetic graphics. This is a key part of the course; it is relatively easy to learn to use software tools, but it is the knowledge of how to do it that will allow students to create professional and appealing graphics that will be highly successful in their purpose: to communicate information to the audience.

1. **Visual communication.** Graphic design is nothing but the communication of information through visual elements. We will explain why it is the best way to communicate for humans and different ways to use it in our research graphics.
2. **The one principle: contrast.** The guiding principle that underlies others is the intentional creation of contrast. We will explain why this is important for visual communication.
3. **The six ways to create contrast.** We will learn the fundamental ways to apply contrast to any graphic, and explain how to use them together.
4. **Typography.** Typography is another one of the basic elements in design and we will learn a few fundamentals of it to allow students to make a good use of text.
5. **Color.** Color is a powerful tool in communication. We will learn the basics of color theory, how to best match colors with meaning, principles of accessibility, and we will suggest online tools to facilitate using color.

# SESSION n.5

In this session we will review different aspects of typical research figures, and learn how to improve them visually, using the design principles learned previously.

1. **Axes, labels, legends, and other figures' elements.** We will go through the different elements that make up scientific figures, and analyze them from a design perspective. We will talk about their function, how they can be best presented visually, and provide specific advice on how to make the most out of them.
2. **Types of charts and when to use them.** There are several types of charts and they all have different features. We will learn the best application for each type of chart, depending on the data to be represented.

# SESSION n.6

We will learn about information design, which is a part of design specifically geared towards presenting information for its efficient understanding. Besides making good graphics, the way they are arranged and presented can make a big impact on how the audience perceives a figure or a poster, and it is very useful to understand and apply these principles.

1. **The importance of aesthetics.** Aesthetics is natural to humans, and it is involuntarily perceived and has an impact on our interpretation of our environment. We will talk about why aesthetics has an important role in communication and suggest different ways to improve the aesthetics of our graphics.
2. **Clarity and negative space.** A frequently overlooked and absolutely important aspect of design is the negative space, the parts without content. We will explain why it is so important, why it helps create clear graphics, how that improves communication and how we can properly use negative space.
3. **Hierarchy and flow.** There is a natural and intuitive way in which humans look at and interpret information. We will learn what hierarchy and flow are, and how to use them to make our figures easier to follow along and to understand for any audience.
4. **Representing relationships.** An important part of designing information is to show relationships between elements, or the lack of it. There are several principles to represent relationships and we will learn what they are and how to use them.

## SESSIONS n.7-8

The last two sessions will be optional, and their realization will depend on attendance, although all students will be encouraged to attend and participate. Over the duration of the course, everyone in the class will be able to develop their own graphics or figures as they learn different aspects of design. Finally, in these last sessions, those who want to participate will be able to showcase their work in front of the class. We will discuss the graphics presented, starting with my feedback and suggestions, and giving the chance to other students who wish to provide constructive criticism.

This type of discussion is immensely important and productive in any professional design environment, and I am sure it will help students integrate the concepts they learn, as well as see them in practice and learn more about the complexity of creating a real design.

If by any limitation of time or the amount of works submitted, it wasn't possible to discuss all designs in the assigned duration of these sessions, the students will be guaranteed my complete feedback at a later time. Additionally, if there is an appropriate medium for it, and the students agree, we will develop a way to create discussion groups outside of the course where these feedback sessions can take place involving more people, so everyone has access to diverse points of view on their work.