

# Perception and Attention in Digital Media: Website Expertise in Sensory Perception

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## Introduction

For this expertise, I choose the website of my home university <https://is.muni.cz/prihlaska/?lang=en> where potential students can search for fields of study and create a new application. I am going to examine website usability and accessibility for disabled people according to a pragmatic episode of finding a specific page with information about General Medicine Programme courses. I suppose that University should not disadvantage anyone with disabilities and it should offer equal education for everyone, which starts even in choosing the appropriate field of study.

In this work, I am going to determine how well that website is working and if it enables the smooth process of searching for studies even for people who have a visual impairment, poor vision disability or total visual disability. I aim to find out possible defects and to suggest improvements.

Research questions:

1. Does this website includes small text? Is it possible to zoom text on the website for people with poor vision disability?
2. Can people with color blindness disease see all the page elements correctly?
3. Is that website designed to be readable by screen reader programs?

## Theoretical Background

Sensory perception is a very important component that can affect website accessibility. A person with no disability cannot even imagine how challenging can be for someone to understand sensory information. Since there are so many people who have different types of disabilities it is needed to design websites so that everybody can access it fully.

If we are using sensory characteristics such as color, shapes, size, visual location or orientation on website, it must definitely not be the only means used to convey information.<sup>1</sup> While creating a website that should be available to all the users (with or without various disabilities) we need to think about its accessibility. For example, we should not use color to distinguish important information, links or objects because it can be a problem for user who can not perceive the color. Moreover, we should avoid using small texts for people who have poor vision disability and ensure sufficient zooming function. For people who need to use a screen reader we should not forget to use enough metadata. People use various assistive technologies to understand information on website, that means, to ensure everybody can access our website, we should use alternative methods to convey sensory characteristics.

Web Content Accessibility Guidelines<sup>2</sup> offers recommendations on how we can adjust website to be accessible also for people with disabilities. For example instead of color, it is advisable to add some

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<sup>1</sup> *Web Accessibility Criteria - Color and Sensory Characteristics*. California State University, Northridge - Universal Design Center.[2021-02-15]. Available at: <https://www.csun.edu/universal-design-center/web-accessibility-criteria-color-and-sensory-characteristics#WC>

<sup>2</sup> *Web Content Accessibility Guidelines (WCAG) 2.1*. W3C. Recommendation 05 June 2018. [2021-02-15]. Available at: <https://www.w3.org/TR/WCAG21/>

symbols for emphasizing important text, use underlined text for links or provide textual information for all elements on the page including images and buttons and so on.

Research conducted by Universiti Kebangsaan Malaysia<sup>3</sup> examined how users with visual disabilities interact with the university web. Thanks to them a university website prototype was developed that allows eliminating barriers in access. Unfortunately, this research couldn't aim for all kinds of disabilities and it also doesn't include a representative number of participants, but finally many aspects of disabled unfriendly environment was revealed and repaired to let the majority of disabled people use the web.

## Methods

For expertise, I choose university website because of the belief that it should be accessible by anyone. A particular episode was chosen because every potential student (with or without disabilities) should have access to courses that are taught at specific field of study. I decided to demonstrate it on General Medicine Programme only by my personal preferences. Of course this information can be achievable from other pages of the university. I choose website with application for study because I consider this website even more important to be accessible by anyone. As far as I am concerned, there is no alternative for reaching page with General Medicine Programme courses from my starting point.

In my work, I am combining an expert walk through through a chosen scenario of finding General Medicine Programme courses information in that I concentrate on the size of texts and the possibility of zooming. While coming through this task I take notes and appropriate screenshots.

Then I am using the Colorblind Web Page Filter tool to detect how people with color blindness see the website and evaluate how easy it is for them to see different elements while completing the given task. In addition to Colorblind Web Page Filter I also use RGBblind extension to Chrome browser to see interactive mode pages with trying various elements. To ensure I do not look at pages only with my subjective view I also use in this stage Wave tool for identification of contrast errors.

Third, I use Wave tool for detection if a specific website is designed to be readable by screen reader for people who are completely blind.

After data collection I use quantitative analysis to find out how well the website is adapted to people with vision disability.

## Results

### 1. Does this website includes small text? Is it possible to zoom text on the website for people with poor vision disability?

I went through the whole scenario while observing small texts on all the pages. I realized that pages often contain small texts. As you can see on screenshot below small text appeared usually in gray texts that seem to have description role, but it was possible to use zoom very comfortably to see this text in

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<sup>3</sup> HASSOUNA, Mohammed Saleh, Noraidah SAHARI and Amirah ISMAIL. *UNIVERSITY WEBSITE ACCESSIBILITY FOR TOTALLY BLIND USERS*. Faculty of Information Science and Technology Universiti Kebangsaan Malaysia, Malaysia. Journal of ICT, 16, No. 1 (June) 2017, pp: 63–80. [2021-02-15]. Available at: <http://www.e-journal.uum.edu.my/index.php/jict/article/view/8218/1236>

big size. I consider this research question as completed with a positive result in evaluation. In this point of view it works exactly in accordance with disability-friendly environment.

[IS](#) > [Admission Procedures](#) > [Programme Selection](#)

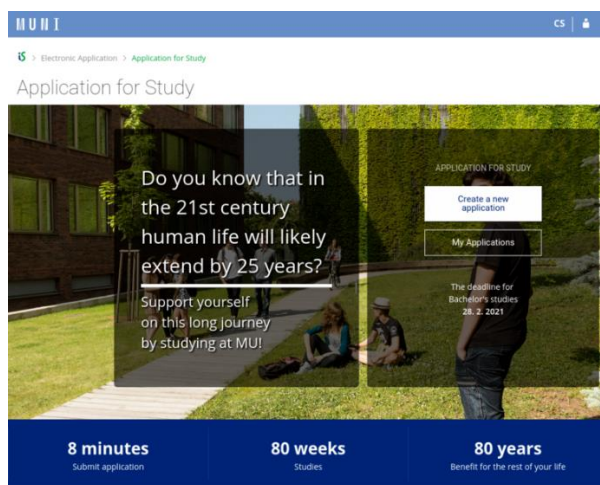
## Programme Selection

<div>?</div> <div>Area of studies</div> <div>Select area of studies</div> <div>▼</div>	<div>✓</div> <div>Type of studies</div> <div>Bachelor's and Master's</div> <div>(usually after graduating from secondary school)</div> <div>▼</div>	<div>✓</div> <div>Study Mode</div> <div>Teaching on working days</div> <div>(Full-time study mode)</div> <div>▼</div>
<div>?</div> <div>Faculty</div> <div>Any faculty</div> <div>▼</div>	<div>?</div> <div>Language of studies</div> <div>Any language</div> <div>▼</div>	

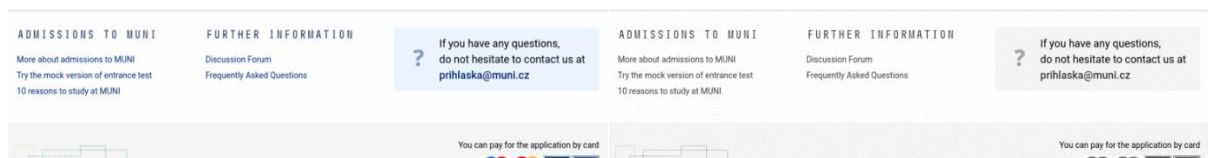
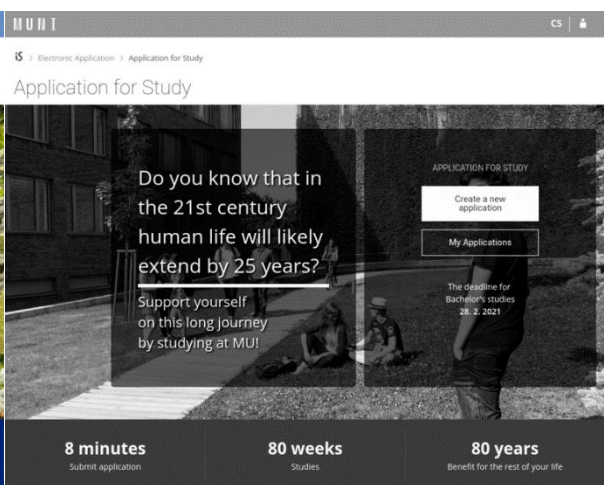
## 2. Can people with color blindness disease see properly all the page elements?

I used Colorblind Web Page Filter and RGBblind tools to investigate pages in a way how colorblind people with diseases such as achromatopsia, protanopia, deuteranopia and tritanopia see the website content. In the following screenshots you can see starting page with individual filters.

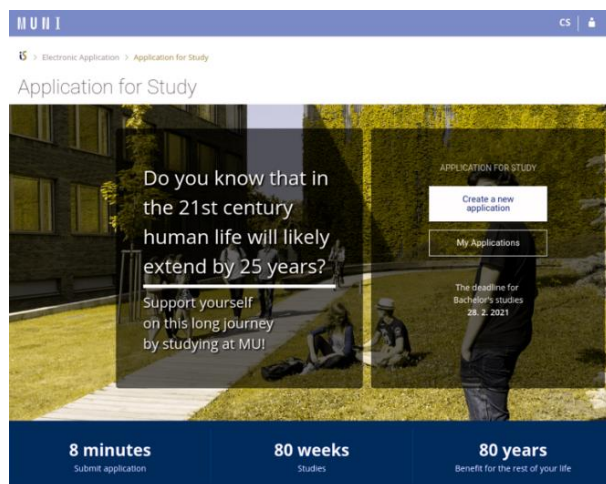
### Original 1<sup>th</sup> page



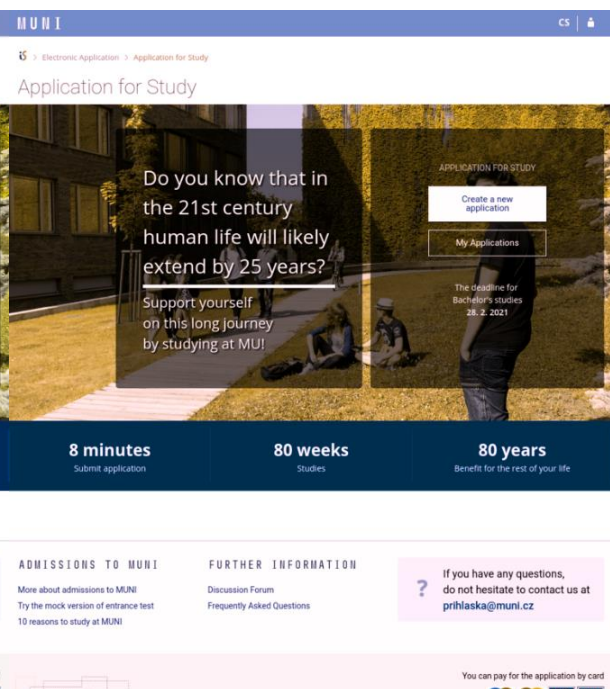
### Greyscale/Achromatopsia



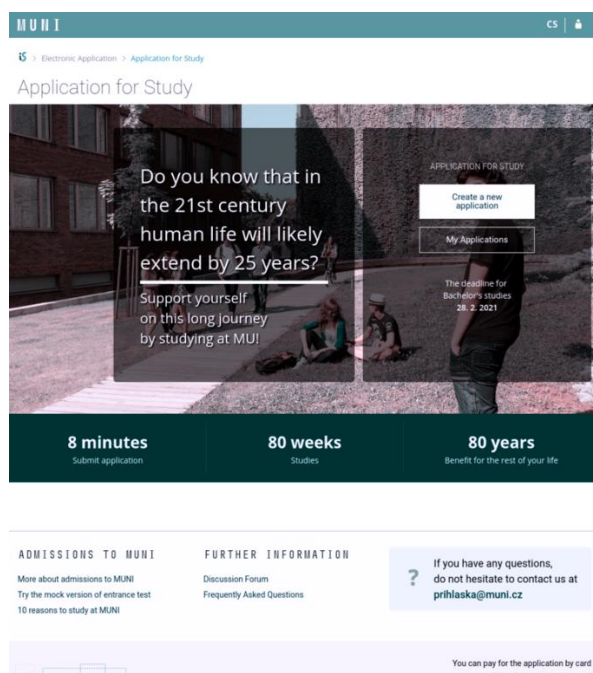
## Protanopia



## Deuteranopia



## Tritanopia



As it is visible, even in colorblind eyes all the tests are readable and even pictures seem to be easily recognizable. I see no contrast error in any of those views. However, Wave tool recognized 10 contrast errors in the first page of expertise. Wave suggests not to use white text on blue background, so obviously this can be tricky for some people and so it is needed to consider some ways of improving this contrast issue.

Next screenshots show second page of interaction. Again I did not see any problems with impaired readability of texts. I did not recognize any contrast errors even Wave tool evaluate thin gray texts on white background as problematic. I agree because when I look at such a thin text I consider it as not so important. I think it could lead to complete ignorance by people.

## Original 2<sup>nd</sup> page

Application for Study

CS

Application for Study

CS

Admission Procedures

Programme Selection

Programme Selection

Area of studies

Medicine, healthcare

Type of studies

Bachelor's and Master's

usually after graduating from secondary school

Study Mode

Teaching on working days

Full-time study mode

Faculty

Faculty of Medicine

Language of studies

English

Specify what you are looking for

Find

Search results: 2

Please be aware of tuition fees for degree programmes in a foreign language.

Dentistry

General Medicine

ADMISSIONS TO MUNI

FURTHER INFORMATION

If you have any questions, do not hesitate to contact us at [prhlaska@muni.cz](mailto:prhlaska@muni.cz)

ADMISSIONS TO MUNI

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You can pay for the application by card

You can pay for the application by card

## Grayscale/Achromatopsia

Application for Study

CS

Application for Study

CS

Admission Procedures

Programme Selection

Programme Selection

Area of studies

Medicine, healthcare

Type of studies

Bachelor's and Master's

usually after graduating from secondary school

Study Mode

Teaching on working days

Full-time study mode

Faculty

Faculty of Medicine

Language of studies

English

Specify what you are looking for

Find

Search results: 2

Please be aware of tuition fees for degree programmes in a foreign language.

Dentistry

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## Protanopia

Application for Study

CS

Application for Study

CS

Admission Procedures

Programme Selection

Programme Selection

Area of studies

Medicine, healthcare

Type of studies

Bachelor's and Master's

usually after graduating from secondary school

Study Mode

Teaching on working days

Full-time study mode

Faculty

Faculty of Medicine

Language of studies

English

Specify what you are looking for

Find

Search results: 2

Please be aware of tuition fees for degree programmes in a foreign language.

Dentistry

General Medicine

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You can pay for the application by card

You can pay for the application by card

## Deuteranopia

Application for Study

CS

Application for Study

CS

Admission Procedures

Programme Selection

Programme Selection

Area of studies

Medicine, healthcare

Type of studies

Bachelor's and Master's

usually after graduating from secondary school

Study Mode

Teaching on working days

Full-time study mode

Faculty

Faculty of Medicine

Language of studies

English

Specify what you are looking for

Find

Search results: 2

Please be aware of tuition fees for degree programmes in a foreign language.

Dentistry

General Medicine

ADMISSIONS TO MUNI

FURTHER INFORMATION

If you have any questions, do not hesitate to contact us at [prhlaska@muni.cz](mailto:prhlaska@muni.cz)

ADMISSIONS TO MUNI

FURTHER INFORMATION

If you have any questions, do not hesitate to contact us at [prhlaska@muni.cz](mailto:prhlaska@muni.cz)

You can pay for the application by card

You can pay for the application by card



## Tritanopia

MUNI

Application for Study

CS

Admission Procedures

Programme Selection

### Programme Selection

Area of studies  
✓ Medicine, healthcare

Type of studies  
✓ Bachelor's and Master's  
(usually after graduating from secondary school)

Study Mode  
✓ Teaching on working days  
(full-time study mode)

Faculty  
✓ Faculty of Medicine

Language of studies  
✓ English

Specify what you are looking for

Find

Search results: 2

?

Please be aware of tuition fees for degree programmes in a foreign language.

Dentistry LF

General Medicine LF

ADMISSIONS TO MUNI

FURTHER INFORMATION

?

If you have any questions,  
do not hesitate to contact us at  
[prihlaska@muni.cz](mailto:prihlaska@muni.cz)

More about admissions to MUNI  
Try the mock version of entrance test  
10 reasons to study at MUNI

Discussion Forum  
Frequently Asked Questions

You can pay for the application by card

The third page again contains thin gray text and also white text on blue background. Those things were discussed above, so I will not mention them again. Apart from this, all elements on this page are visible. The same is valid for all the following pages 4th, 5th, and 6th. In general, I would say that concerning colors website is well-designed. There are only minor errors that can be easily removed. Even on the 5th page, where the black text is on a yellow background, and I thought it could cause troubles according to evaluation tools, it was good. I think web designers have chosen minimalistic design with just a small amount of colors to avoid color perception problems.

## Original 3<sup>th</sup> page

← → ↺

is.muni.cz/prihlaska/info?lang=en&f=%20rf1411%20rpP%20rjeng%20rko3%20rtB%7CrtM%20program=23439;beh=1723

🔍 ☆ 🌐 🛠️ 🧑 Pozastavená

Aplikácie Facebook YouTube Gmail Prekladač Google 📖 Grammarly 📧 Slack 📷 Fotorecept: Domác... 🌐 PARADOR - kvalitn...

MUNI

Application for Study

CS

Admission Procedures

Programme Selection

Application for Study

### Application for Study

MUNI  
MED

Faculty of Medicine

General Medicine

E-application for General Medicine and Dentistry in English via agencies abroad  
2021/2022

Submission deadline until midnight 8/8/2021

Type of degree programme  
Master's degree programme

Language of instruction  
English

Programme details

I wish to study as a single-subject programme  
During your single-subject studies, you will focus fully on the study of a given discipline in its entirety.

General Medicine

full-time

Create a new application

## Protanopia

← → ↺

is.muni.cz/prihlaska/info?lang=en,f=%20r:f1411%20r:p%20r:jeng%20r:ko3%20r:tB%7Cr:tM%20;program=23439;beh=1723

🔍 ☆ 🌐 ⚙️ 👤 Pozastavená ⋮

Aplikácie Facebook YouTube Gmail Prekladač Google Grammarly Slack Fotorecept: Domác... PARADOR - kvalitn...

MUNI MED

Application for Study

CS 👤

🇸🇰 > Admission Procedures > Programme Selection > Application for Study

Application for Study

MUNI MED

Faculty of Medicine  
**General Medicine**  
E-application for General Medicine and Dentistry in English via agencies abroad  
2021/2022  
Submission deadline until midnight 8/8/2021

Type of degree programme  
**Master's degree programme**  
Language of instruction  
🇬🇧 **English**  
🔗 Programme details

I wish to study as a single-subject programme

During your single-subject studies, you will focus fully on the study of a given discipline in its entirety.

General Medicine

full-time

Create a new application

## Deuteranopia

← → ↺

is.muni.cz/prihlaska/info?lang=en,f=%20r:f1411%20r:p%20r:jeng%20r:ko3%20r:tB%7Cr:tM%20;program=23439;beh=1723

🔍 ☆ 🌐 ⚙️ 👤 Pozastavená ⋮

Aplikácie Facebook YouTube Gmail Prekladač Google Grammarly Slack Fotorecept: Domác... PARADOR - kvalitn...

MUNI MED

Application for Study

CS 👤

🇸🇰 > Admission Procedures > Programme Selection > Application for Study

Application for Study

MUNI MED

Faculty of Medicine  
**General Medicine**  
E-application for General Medicine and Dentistry in English via agencies abroad  
2021/2022  
Submission deadline until midnight 8/8/2021

Type of degree programme  
**Master's degree programme**  
Language of instruction  
🇬🇧 **English**  
🔗 Programme details

I wish to study as a single-subject programme

During your single-subject studies, you will focus fully on the study of a given discipline in its entirety.

General Medicine

full-time

Create a new application

## Original 4<sup>th</sup> page

is.muni.cz/prihlaska/info?lang=en,f=%20r:f1411%20rpP%20rko3%20rtB%7CrtM%20;program=23439;beh=1723

Aplikácie Facebook YouTube Gmail Prekladač Google Grammarly Slack Fotorecept: Domác... PARADOR - kvalitn...

MUNI Application for Study CS

### General Medicine

#### Degree programme objectives

This six-year full-time Master's study programme is designed to prepare students for the medical profession. By completing their studies, students earn the MUDr. (Doctor of General Medicine) degree. The programme is designed for graduates of secondary schools completed with a school-leaving examination. In the course of the first two years, the curriculum includes primarily theoretical courses (Biology, Biophysics, Chemistry and Biochemistry, Anatomy, Histology, and Physiology). To be able to complete these courses, students need excellent knowledge of science subjects at grammar school level. The classes consist of lectures, laboratory practicals, and seminars.

#### Study plans

**General Medicine**  
full-time, single-subject

#### Studies


- Objectives
- Learning Outcomes
- Occupational Profiles of Graduates
- Regulated Professions
- Practical Training

#### Basic information

Type: **Master's degree programme**  
Profile: **academic**  
Degree: **MUDr.**  
Length of studies: **6 years**  
Language of instruction: **English**  
Annual tuition fee: **300000 Kč**

**200**  
estimated number of admitted

**269**  
number of active students

 Programme guaranteed by Faculty of Medicine

## Original 5<sup>th</sup> page

is.muni.cz/predmety/studijni\_plan?lang=en,plan\_id=23440

Aplikácie Facebook YouTube Gmail Prekladač Google Grammarly Slack Fotorecept: Domác... PARADOR - kvalitn...

MUNI

> Programmes catalogue > General Medicine > Passing the study plan

### Passing the study plan

View data

Sort by semester Standard sorting Presentation

#### LF MGM01 General Medicine

Name in Czech: General Medicine  
Master's long-cycle full-time  
Included in the programme: LF M-GM General Medicine

Student completes all compulsory subjects. During the 1st-6th. semester compulsory course of physical education. The condition for writing to the next semester is to obtain min. 20 credits, registration of courses is conditional upon the completion of the relevant prerequisites.

#### 1st year

Code	Name	Guarantor	Type of Completion	Extent and Intensity	Credits	Term	Profile Cat.
LFaVLAN0121c	Anatomy I - dissection	M. Joukal	z	0/1.3/0 20.	2	1	P
LFaVLAN0121p	Anatomy I - lecture	M. Joukal	z	3/0/0 45.	2	1	P
LFaVLAN0121s	Anatomy I - seminar	M. Joukal	z	0/3/0 45.	2	1	P
LFaVLAN0121t	Anatomy 1 - practice	M. Joukal	z	0/0.4/0 6.	1	1	Z



## Original 6<sup>th</sup> page

The screenshot shows a web browser window with the URL [is.muni.cz/course/med/aVLAN0121c](https://is.muni.cz/course/med/aVLAN0121c). The browser's address bar and tabs are visible at the top. The page header features the MUNI logo and navigation links. The main content area is titled "LF:aVLAN0121c Anatomy I - dis. - Course Information". Below the title, there is a section for "aVLAN0121c Anatomy I - dissection" under the "Faculty of Medicine" for "autumn 2020". The page lists the "Extent and Intensity" (0/1, 3/0, 2 credits), "Teacher(s)" (a list of seminar tutors including MUDr. Karolína Bretová, prof. RNDr. Petr Dubový, CSc., Veronika Dzetkulicová, MSc., MUDr. Ivana Hradilová Sviženská, CSc., MUDr. Marek Joukal, Ph.D., MUDr. Vojtěch Karvay, MUDr. Erik Kročka, MVDr. Lucie Kubičková, Mgr. Klauďa Lakatosová, MUDr. Kateřina Manová Kubičková, MUDr. Zuzana Musilová, MVDr. Ivana Pračková, RNDr. Michaela Račanská, Ph.D., doc. MUDr. Lenka Vargová, Ph.D., RNDr. Kateřina Vymazalová, Ph.D., and Dana Procházková), "Guaranteed by" (MUDr. Marek Joukal, Ph.D., Department of Anatomy - Theoretical Departments - Faculty of Medicine), and a "Timetable of Seminar Groups" (aVLAN0121c/28\_33: Mon 18. 1. 8:00-17:00 F01B2/2536, Tue 19. 1. 8:00-17:00 F01B2/2536, Wed 20. 1. 8:00-12:00 F01B2/2536, aVLAN0121c/34\_39: Wed 20. 1. 13:00-17:00 F01B2/2536, Thu 21. 1. 8:00-17:00 F01B2/2536, Fri 22. 1. 8:00-17:00 F01B2/2536).

I would like to demonstrate how the university works with color, distinguishing various faculties in the following screenshot. Every faculty has its color, and as we can see on screenshots, a person with protanopia can recognize colors. For that case below, the miniature of M in faculty colors is also an available abbreviation of individual faculty to provide textually (not only sensory) information.

## Bonus: original page with programmes catalogue

The screenshot shows the "Programmes catalogue – Faculty of Medicine" page on the MUNI website. The page features a header with the MUNI logo and navigation links. Below the header, there is a section for "Programmes catalogue – Faculty of Medicine". The page displays a grid of faculty logos (LF, FaF, FF, PrF, FSS, PTF, FI, PdF, FSpS, ESF) and a search bar. Below the logos, there are filters for "Type of studies" (All, Bc., Mgr., Ph.D.), "Study Mode" (All, Full-time, Combined), "Language of instruction" (All, Czech, English), and "Field of education" (Select option). The page lists various Bachelor's Studies programs, including Dental Hygiene, Dietitian, General Nursing, Laboratory diagnostic in healthcare, Midwifery, and Optics and Optometry.

## Protanopia

MUNI

Programmes catalogue – Faculty of Medicine

LF FaF FF PrF FSS PPF FI PdF FSpS ESF

search in Programme Catalogue

Type of studies: All Bc. Mgr. Ph.D. Study Mode: All Full-time Combined Language of instruction: All Czech English Field of education: Select option

Bachelor's Studies

- Dental Hygiene
- Laboratory diagnostic in healthcare
- Dietitian
- Midwifery
- General Nursing
- Optics and Optometry

### 3. Is that website designed to be readable by screen reader programs?

The third research question was devoted to the subject if MUNI university's web is designed to be readable by a screen reader. Wave accessibility evaluation tool was used for the expertise and unfortunately, on most pages, high number of ARIA problems were detected. Accessible Rich Internet Applications (ARIA) represents a set of attributes added to HTML elements to define how can assistive technology access web content and mediate it to user with a disability.<sup>4</sup>

It was shown that majority of description contains only unreadable mixture of numbers and another characters and many of labels are in Slovak language although I was examining the English version of website.

WAVE powered by WebAIM web accessibility evaluation tool

Address: https://is.muni.cz/predmety/studijni\_plan?fa... Styles: OFF ON

Details

Summary Details Reference Structure Contrast

670 ARIA

166 X ARIA

Code	Name	Guarantor	Type of Completion
aria-atomic="true"			
aria-label="Mas0121c"	Anatomy I - dissection	M. Joukal	aria-describedby="in6c00-tooltip"
aria-label="Information0121p"	Anatomy I - lecture	M. Joukal	aria-describedby="in6c00-tooltip"
LF:aVLAN0121s	Anatomy I - seminar	M. Joukal	aria-describedby="in6c00-tooltip"

```
<td class="text-center">
  <span data-tooltip="y7b418-tooltip" aria-haspopup="true" class="has-tip top"
    titles="" aria-describedby="in6c00-tooltip" data-yeti-box="in6c00-tooltip" data-
    toggle="in6c00-tooltip" data-resize="in6c00-tooltip" data-events="resize">
  </span>
</td>
<td class="hide-for-small-only text-center">
  0/1.3/0 20.
  ...
```

<sup>4</sup> SHAW, Kat. *What the Heck is ARIA? A Beginner's Guide to ARIA for Accessibility*. Lullabot, 2021. [2021-02-16]. Available at: <https://www.lullabot.com/articles/what-heck-aria-beginners-guide-aria-accessibility>

## Conclusion

Webpages often contain small texts, but if there is small text user is allowed to zoom comfortably.

With the help of tools for the colorblind filter, I went through all the pages with colorblind eyes. I did not find any significant issues that would cause any difficulties to people with poor vision disabilities. Only white text on the blue background and thin grey text is considered a little bit disputable. In places where colors could cause trouble, there was also information added in written form.

Finally, I used the Wave tool for every page I went through, and I realized many places with very low ARIA. It means this web is not designed to be readable by completely blind people who are reliant on assistive technologies.

To sum up, I have appreciated how the website deals with colors and possible accessibility issues that disabilities can cause. Everything worked well in the context of the size of texts, zooming function, and colors used to convey information. The biggest problem was invisible in ordinary people's first sight – html descriptions in Slovak language or even no description at all.

To improve this website, I would recommend the first translation of all html elements in the Slovak language into English. As the page is in English, it should be in their language to be understandable for English people with disabilities. The website should work on ARIA to become accessible by anyone as it is desirable from an institute like a university.

Secondly, I suggest transforming thin gray text into a classic black text in a bigger size. It seems this is how the website holds its style, but I think, from a practical point of view, the black text would be better readable. With this, we could overcome ignoring some parts by the user. For the white text on a blue background, I would choose to make the font thicker and the background color lighter.